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EDITOR OF THE MONTH

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INTERNAL RADIANT HEAT IN LESIONS OF THE PELVIS

BENGT NORMAN BENGTSON, M.D.

MAYWOOD, ILLINOIS

Heat was advised for lesions of the female pelvis as early as the third century B. C. The earliest practices were exceedingly crude and for present consideration are of merely historic interest. Suffice it to say that none have survived with the exception of the hot water douche.

In recent years investigators have attempted the heating of the vaginal vault to its critical temperature. More recently others have inflated the vagina and then have maintained subcritical temperatures for prolonged periods. In the latter advances an elastic rubber bag has been utilized. The medium used to transfer the heat to the tissues has varied. Some investigators have utilized liquids, such as water; others have used gases, such as air. In the most acceptable present day methods, exclusive of short wave diathermy, the transfer of heat has been accomplished mainly by means of conduction. Furthermore, with these methods the heat created within the circulating system has had to be conducted through the walls of the confining rubber envelope in order to reach the pelvic tissues.

Rubber, liquids and most gases at atmospheric pressure are poor conductors of heat. Almost all liquids have a high degree of thermal inertia.* Therefore, methods which employ rubber bags and utilize air or water as the heating medium must of necessity have established high temperatures in order to accomplish anything approaching therapeutic heating in the pelvic tissues.

Experimentation has proved this fact. To attain a temperature range of 105 to 108 F. between the rubber bag and the vaginal wall it was necessary to have the water inside the rubber bag reach a temperature of about 130 F. Evidence of the high thermal inertia of water was demonstrated in one experiment by the slight difference between the temperature of the delivered water and that of the return flow. At no time during the testing did the difference exceed 0.6 degree F.

Somne stated that the critical temperature to which tissue can be subjected for a limited time without a burn is just under 114 F. Obviously, then, any heating medium which must depend on a temperature of 130 F. in order to attain a desired therapeutic effect and which has at the same time a high degree of thermal inertia would probably produce a burn of the vaginal wall should the bag rupture during therapy. Because of these physical disadvantages and because of potential clinical hazards, the transfer of heat by means of radiation seemed worth considering. Radiation heat transfer is distinguished from conduction and convection by the fact that the medium through which the transfer occurs is not heated unless there is actual absorption of the radiation. The best example of the action of radiation is the sun's energy, which travels earthward purely as a wave motion, becoming heat only after it is absorbed by the earth's surface. Stefan's law states that theoretically the total energy emitted by a black body (ideal radiator) varies directly to the fourth power of the absolute temperature.**

* To get some idea of the approximate difference in the amount of radiation (emissivity) as the temperature of the source increases, let us assume one radiator operating at 700 C. (dull red heat for most solids) and another at 1400 C. (white heat for most solids). There is about eight times more radiation in the latter case than in the former, although the difference in temperature of the radiators is only double.

** For example, one can take a test tube filled with cracked ice and heat the upper third to the boiling point of water and the ice in the bottom of the tube will not have melted.

An emitting source, then, must be at a high temperature to transfer great amounts of therapeutic energy solely by radiation. Further, as the temperature of such a filament is increased, the wavelengths of the radiation become shorter and shorter (Wien's displacement law). Theoretically, if the temperature is increased to a sufficient degree without melting the filament, it is conceivable that the wavelength displacement is such that large amounts of ultraviolet rays are generated and emitted.

For therapeutic consideration, to approximate such an intense theoretic temperature is neither practical nor necessary. There is, however, an optimal filament temperature at which the greatest output of short infra-red waves can be obtained. With the filament material used in the succeeding experiments the optimal filament temperature was approximately 2000 C.

Maximal deep tissue heating should be conveniently accomplished by utilizing such a filament in a tubular light bulb. And despite the high temperature necessarily developed by that type of filament to create luminosity and sufficient radiant energy for therapeutic heating purposes, the thermal inertia of the filament should be sufficiently low so that its heat could be decreased to a safe tissue temperature instantly by the operation of a simple device to control the current. The accuracy of these deductions was proved by experimentation. A light bulb was operated at varying voltages. The surface was either left clear for transmitting radiation or was coated black for transforming all radiation into heat. Rabbit ears were folded so as to have eight consecutive layers varying from 1.3 to 1.5 mm. in thickness. This set of tissue layers was brought in contact with the light bulb, and a thermocouple was inserted between the bulb and the first layer (position) and behind the second and subsequently the fourth layer. The original (body and ear) temperatures were read first and the final (stationary) temperatures determined later. Table 1 demonstrates the increase in temperature at different depths.

TABLE 1. — *Increase in Temperature at Different Depths (Rabbit Ears)*

Source	Surface, C.	2 Layers Deep, C.	4 Layers Deep, C.
25W 110 V clear	12	5.5	4.0
25W 110 V blacked	19	5.0	2.4
15W 125 V clear	7.5	3.2	1.5
25W 90 V clear	8.3	2.5	1.0
15W 90 V clear	9.3	2.4	0.8
25W 80 V blacked	11.2	4.5	0.7

From this table, one notices that the heating from the heated (blacked) surface by conduction is superficial. Either the surface is overheated (19 C. and animal struggling) or the deep effect (0.8 to 0.7 C.) is small. Deep heating, then, is much better accomplished by conversion of radiated energy. The highest relative deep heat was produced by a 25 watt bulb operated at 110 volts.

By employing a graduated filament as the source of energy in a series of experiments on human beings there was found a convenient and highly efficient method of introducing heat into pelvic tissues.

Description of Unit

The radiating element found to be the most satisfactory and the most efficient consisted of a special filament with a varying temperature gradient along its axis, which when in operation served to distribute its heat energy more or less equally into all portions of the vaginal vault. Thus, the temperature of the filament in operation became the highest at the greatest absorbing surface of the vaginal mucosa and the lowest adjacent to the

vulvar outlet. It was further deemed advisable to house this heating element in a sturdy glass speculum as an added precaution against possible breakage of the unit while in operation.

The fact that glass is a good absorber and a poor conductor of heat would naturally be important. Furthermore, the glass in the speculum had to be made sufficiently thick to overcome all hazards of its breakage. Thus, there would develop a great temperature difference between the outside and the inside of the speculum during treatment.

There are many types of glass on the market, and these exhibit different characteristics of wavelength transmission; that is, certain radiations pass through some types of glass more easily than through others. Therefore, in deciding which type was best suited for the speculum it was necessary to consider which had good characteristics of spectral transmission in the wavelengths best suited for deep tissue heating purposes. Pyrex glass was finally chosen because its spectral transmission is such that most of the important shorter infra-red waves pass through unaltered to be absorbed by the vaginal tissues.

The pyrex sheath which serves as a speculum and as a protector by

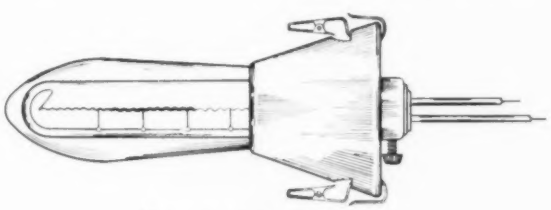

Fig. 1. — Applicator Assembly.

housing the filament and bulb is 4½ inches long. There is a groove near the open end which provides a snug seat for the vulvar outlet, while the rubber dam produces a seal to retain any discharge that may accumulate during therapy. The rubber dam, because of its insulating properties and flaring ends, has the added advantage of keeping the thermal-sensitive vaginal lips separated and almost at, or slightly above, body temperature during treatment. The speculum, with its thick wall, serves as an excellent

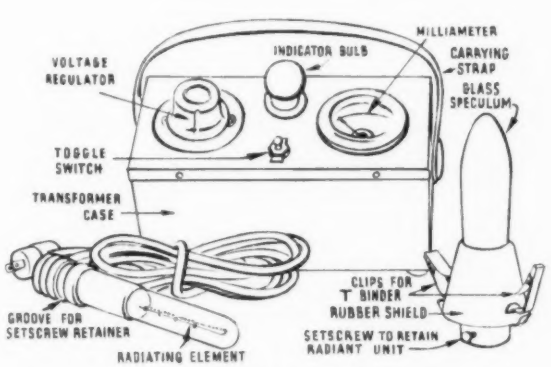

Fig. 2. — Assembly of entire unit.

guard should the glass bulb surrounding the radiating unit be broken accidentally (fig. 1). Two leads covered with rubber connect the radiating unit to a transformer control and meter, which are housed in a separate box (fig. 2).

Because no previous reports of clinical work on heating of the vagina by means of radiant energy were found in the literature, it was necessary to make precise measurements of the temperature of the vaginal wall during treatment to develop a technic for the application of maximal heat without the production of a burn.

A Leeds and Northrup thermocouple and potentiometer were used to measure the temperature of the vaginal wall. The thermocouple was placed between the glass speculum and the vaginal wall. Because the thermocouple is an excellent conductor of heat and also is small, the effect of absorption of radiation and other variations were easily controlled and reasonably true temperatures of the surface of the vaginal wall were obtained.

The temperature of the vaginal walls of different normal women showed variations for a given rate of production of radiant energy. The differences are thought to be the result of the varying efficiencies of the circulation of the different pelves. Their respective abilities to absorb and to disperse the accumulating heat or to improve pelvic circulation under radiant therapy are also factors. In consequence, the meter which originally was calibrated only in milliamperes finally was calibrated also in colored segments so as to indicate the average fluctuations of temperature. At 400 milliamperes, for example, the vaginal temperatures ranged from 106 to 112 F. in experimental subjects without pathologic lesions of the pelvis. The vaginal temperature rose abruptly after the unit was turned on and reached a level of stability in from five to ten minutes per given milliamperage input in all patients tested. In pathologic conditions, however, in which the flow of the blood was altered because of obstructive inflammation (especially in pelvic peritonitis), a much more marked change in vaginal temperatures was obtained. Although ordinarily the gynecologically healthy patient experiences no great discomfort until the temperature of the vaginal wall reaches 114 F., a patient with bilateral salpingitis had reached the end of her heat tolerance at a temperature of 112 F., 400 milliamperes.

Since the temperature inside the glass speculum drops almost immediately when the current of the filament changes from higher to lower (owing to the low thermal inertia of the filament), it was possible to approach temperatures just under 114 F. without danger of a burn (fig. 3). However, most of the patients were not able to tolerate comfortably temperatures just under 114 F. for any appreciable length of time.

A safe operating current for all patients was at 320 milliamperes, while the current of maximal comfortable tolerance was at 405 milliamperes, the special radiator being used. These figures were determined by carefully tabulating each patient's reaction of tolerance to her sensation of uncomfortable heat and making numerous cross checkings using the thermocouple and potentiometer.

Clinical Technic

The unit is simple to operate. The lubricated speculum is easily slipped into the normal-sized vagina. Metal clips attached to the flaring mouth of the speculum can be clipped firmly yet without discomfort to the tails of a sanitary belt or to improvised gauze tails. The transformer is placed at the side of the patient, so that the dial for the control of the current and the switch for the meter are convenient.

At the beginning of each treatment the current should be set at 250 milliamperes for three minutes. This allows time for the temperature of the tissue to build up relatively slowly. The current should then be increased about 50 milliamperes each minute until about 400 milliamperes is reached. This rate of increase compensates for any possible lag of circulation, and it

gives the patient's flow of blood ample time to readjust itself to the task of properly redistributing the heat due to the absorption of radiation. After approximately ten minutes of operation the current may be adjusted to the milliamperage at which a sensation of comfortable warmth is felt.

Clinical Observations

There were 31 patients in the series for therapy or observation. The clinical material studied was obtained from private practice and from Cook County, Mercy and the University hospitals in Chicago.

Of the 31 patients, 11 had no gynecologic lesions. Of the remaining 20, 3 had tubo-ovarian abscesses, 2 had pelvic abscesses, 2 had oophoritis, 4 had chronic pelvic inflammatory disease, 4 had severe low backache associated with endocervicitis, 4 had severe backache unassociated with endometritis or other demonstrable pelvic lesion and 1 had pelvic gonorrhea with multiple

TABLE 2. — *Typical Case Reports.*

Patient	Age-Race	Diagnosis	Days Elapsed Before Application of Heat*	Temperature at Time Radiant Heat Ordered, F.	Radiant Heat Prescription	Temperature During Radiant Heat Therapy, F.	Comment
1. H. C. (para III)	40 Negro	Pelvic abscess	6	104	2 hr. per day; 300 ma. to start; raised to 350; treatment for 8 days	99.5 second day; 110.2 third day; normal fourth and fifth days; patient discharged	
2. D. McS.	20 Negro	Pelvic peritonitis with frozen pelvis and tubo-ovarian abscess	4	102	2 hr. per day; 300 ma. to start; raised to 350; treatment for 3 days.	110.2 third day; normal fourth day	Operation refused
3. L. S. (gravida 0)	20 White	Pelvic peritonitis	9	104.6	2 hr. per day; 300 ma. to start; raised to 350; treatment for 4 days	98.8 second day, but rose to 103; 99 fourth day	
4. R. A.	21 White	Pelvis peritonitis	3	103	Given 2 days and discontinued for ten days; resumed for 30 minutes twice daily; 300 ma. to start; raised to 325; treatment for 9 days	98.8 on ninth day; patient discharged	Treated in early experimental stage
5. S. L.	.... Negro	Tubo-ovarian abscess	11	102.6	1 hr. daily; 300 ma. to start; raised to 385; treatment for 4 days	101.8 second day; 98.8 fourth day; patient discharged	

* During the interval before the application of radiant heat the patient was treated by routine measures, including the use of Fowler's position, the application of ice bags to the abdomen, the intravenous administration of fluids, Levine suction and the administration of sulfanilamide.

gonococcic abscesses of the liver and other organs. Five typical cases are summarized in table 2, and of these case 3 is herewith reported in detail.

CASE 3.—L. S., a white woman aged 20, a nullipara, was admitted to Cook County Hospital July 10, 1940 complaining of generalized chills, aching and severe cramping pains in the lower part of the abdomen of five days' duration. Physical examination revealed that she was acutely ill and dehydrated and tossed about restlessly. The temperature was 103.2 F., the pulse rate 120 and the blood pressure 128 systolic and 68 diastolic. The abdomen was markedly tender and rigid in all four quadrants. There were 29 bowel sounds per minute. The Murphy reflex was marked. Rectal examination revealed a mass the size of a golf ball above and to the left of the cervix. The diagnosis was pelvic peritonitis. Immediate treatment consisted of Levine suction, the intravenous injection of 10 per cent dextrose solution and the administration of 15 grains of sulfanilamide four times a day.

On July 13 the temperature was 98 F. and the pulse rate 100. The abdominal pain was still severe and the Murphy reflex marked in the lower right and left quadrants.

On July 14 the temperature was 100.8 F. The patient was cyanotic and apathetic. Acetylsalicylic acid, acetophenetidin and scopolamine hydrobromide were administered for the pain but was not retained. An ice bag was applied to the lower part of the abdomen.

On July 15 the temperature was 99.4, 101.8, 101 and 103.6 F. and the pulse rate 100, 100 and 108. The blood pressure was 118 systolic and 64 diastolic. The patient was nauseated and complained continuously of severe cramping pains in the lower part of the abdomen, saying that she felt "very sick." Fluids were again administered intravenously and the administration of sulfanilamide was continued.

On July 16 the temperature was 103.6, 102.6, 102.4 and 103. The patient was nauseated, listless, drowsy and cyanotic. The rhythm of the pulse was irregular, its force regular and its volume fair. The rate was 104, 112 and 110. An ice bag was applied to the abdomen and ¼ grain morphine sulfate given. The abdomen, however, was tender only in the lower quadrants. The Murphy reflex was lessened. The bowel sounds were normal. The administration of sulfanilamide was discontinued because of the feeling that it might be causing the fever, apathy and nausea.

On July 17 the temperature was 100.8 F. and the pulse rate 90, 90 and 94. The patient was severely anemic, with a hemoglobin content of 70 per cent. The scleras were icteric. A test of the urine for urobilin gave a 4 plus reaction. Acute hemolytic anemia from sulfanilamide was considered.

On July 18 the temperature was 102.8, 102, 100.8, 104.6 and 103.2 F. and the pulse rate 114, 112 and 118. The blood pressure was 100 systolic and 60 diastolic. The abdomen was becoming very tender again, with cramplike pains localizing in the left lower quadrant. The introitus was of normal color. The Bartholin and Skene glands were normal. The vagina admitted two fingers snugly. The cervix was conical and soft. The corpus was displaced outward and slightly to the left. A firm tender mass was attached to the left cornu and extended up to the level of the anterior-superior iliac spine. The right adnexa and posterior part of the cul-de-dac were infiltrated and tender. The Murphy reflex was marked in the left lower quadrant. The impression was of acute pelvic inflammatory disease, with abscess formation. It was decided to try radiant heat, and this was administered for two hours at 300 milliamperes.

On July 19 the temperature was 98.8, 101.8, 103.2 and 103 F. The blood pressure was 102 systolic and 64 diastolic. The patient was feeling better. Objectively, however, there was no change except that the Murphy reflex was somewhat lessened. She was given for two hours radiant heat at 350 milliamperes. She said that the treatment made her "feel good."

On July 20 the temperature was 102.6, 103 and 102.6 F. The patient was in much better spirits. The abdomen was softer. The peritoneal reflex was almost negative. The patient was given heat for one hour radiant at 350 milliamperes.

On July 22 the temperature was 99, 99 and 99.8 F. and the pulse rate 88, 90 and 88. There was no abdominal pain, and tenderness was minimal except in the lower left quadrant. The Murphy reflex was almost absent. Radiant heat was given for one hour at 350 milliamperes.

On July 26 the temperature was 98.4, 99 and 99. The administration of radiant heat was discontinued, and the patient was discharged

Results

In the total series of patients who received radiant therapy, 20 in the first group had pelvic lesions. Of these 1 (L. S.) was assisted by a surgical procedure (prior to radiant therapy), which was an important factor in her recovery. Another (B. S.) had had an abdominal hysterectomy, after which pelvic peritonitis and regional paralytic ileus developed. In addition to radiant therapy, she had dextrose intravenously, levine suction and 4 minims of pitressin every four hours. It was not until the institution of radiant heat for four hours daily that the vaginal discharge began to appear, and it then became more profuse each day. With the appearance of the discharge the temperature began to drop, the lower abdominal rigidity to lessen and the pulse rate to approach normal.

The other patients received no surgical treatment. Every patient treated with radiant heat who had had a tubo-ovarian abscess (2), pelvic peritonitis with a pelvic abscess (3) or pelvic peritonitis not associated with abscess formation (4) seemed to respond to therapy by a rapid convalescence. Of the 4 with severe low backache associated with a purulent vaginal discharge and endocervicitis, 2 obtained complete relief of symptoms, 1 moderate relief

and 1 questionable relief. The endocervicitis in all the patients treated showed no visible improvement. The 4 with severe low backache but without demonstrable pathologic change evidenced neither objective nor subjective improvement. The patient with pelvic gonorrhea had been confined to a private hospital for sixty-two days prior to the use of radiant heat therapy. Despite all recognized forms of therapeutic procedure she continued to get worse, the temperature remaining around 100 F. for days. Radiant therapy was instituted on the sixty-third day, but its use did not seem to affect the progress. The patient died on the eighty-ninth day. Autopsy revealed multiple gonococcic abscesses of the liver and spleen.

Discussion

I believe that the application of radiant heat for pelvic disorders presents greater advantages than present methods which rely mainly on conduction.

Considerable investigation has been done by authorities relative to the superiority of radiant energy over conduction forms of heating. Krusen stated that infra-red radiation of wavelengths between 770 and 1,200 millimicrons is the most penetrating and that if penetration of tissue is desired it is best to use a luminous heat source. Sonne confirmed the experiments with clinical study. He stated that the point of tolerance of cutaneous temperature with luminous rays is 43.5 C. But "this temperature does not decrease with tissue depth, but gradually rises . . . whereas [referring to nonradiant heat] the highest tolerable skin temperature is 45.5 C. and the temperature decreases in direct proportion to the depth of the tissue." Peck expressed the opinion that heating of the blood stream can best be produced with a tungsten filament lamp. Mayer claimed that infra-red rays longer than 1,400 millimicrons are more likely through their superficial absorption to produce cutaneous blisters than those shorter than 1,400 millimicrons (near infra-red and luminous), which penetrate into the skin. McKee confirmed this assumption and added that far infra-red rays may cause severe burns without producing the desired therapeutic effect. Hardy and Muschenheim stated that "all observers agree that it is only within the near infra-red range that any appreciable penetration of the skin occurs and it is evident then that a lamp of high temperature should fall at 1.2 millimicrons . . . a temperature easily reached by a bright tungsten filament."

Bachem has given actual figures for the penetration through and the absorption by the various cutaneous and subcutaneous layers of light of different wavelengths, with the result that the spectral range from red to infra-red secures the greatest relative depth heating (fig. 4).

The therapeutic merit of radiant heat is due mainly to the emission of short infra-red waves and their absorption by the pelvic tissues.

The fact that glass is a poor conductor is of minor importance when radiant heat is being used for vaginal therapeusis, because the important waves get through unchanged (770 to 1,200 millimicrons) and those of higher wavelengths absorbed by the glass comprise less than 11 per cent of the total radiation. That this amount is of small consequence is further seen because the internal temperature of the speculum is 190 F. in air and 160 F. intravaginally with 500 milliamperes of current, and even this is absorbed by the superficial mucous membrane as conduction heat. In fact, this superficial long wave radiation is probably absorbed better than the heat produced by other methods because the shorter waves of radiant heat cause dilatation and accelerate the flow of the deeper circulation. This aids the superficial blood in better transporting and dispersing the heat.

It might seem that methods which distend the vagina to three or four times its usual size and then subject the increased surface to a sustained heat would have a decided advantage over methods which do not do so.

Present pelvic heating methods employ rubber bags to inflate the vagina, and either air or water is used as the medium of transfer of heat. This reverts back to the fact that water and air are poor conductors of heat and in addition must transmit their heat through a material (rubber) whose con-

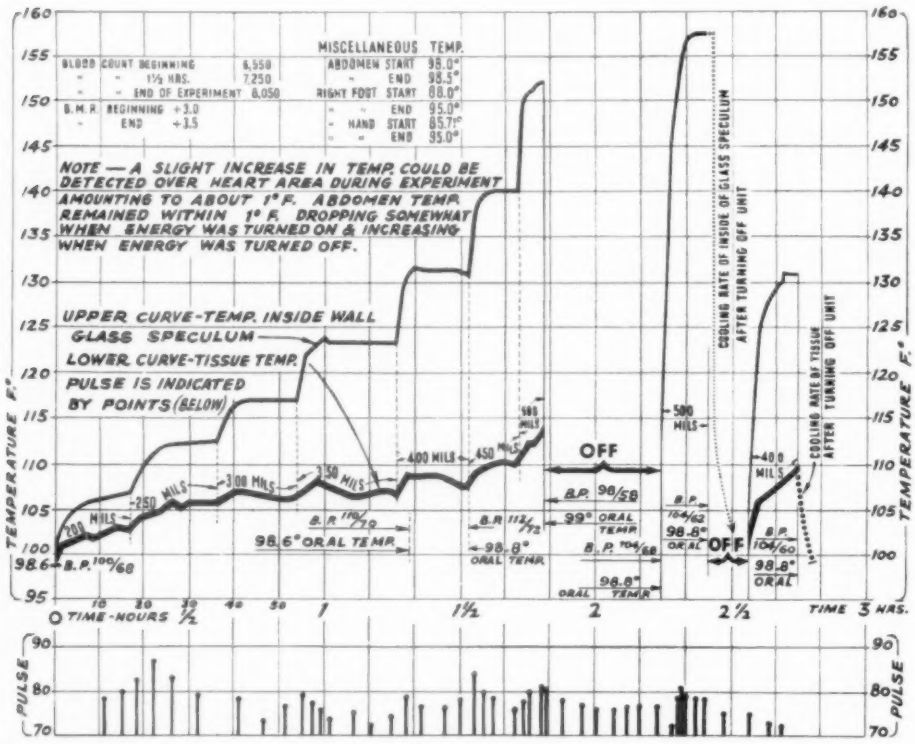
MISCELLANEOUS TEMP.
BLOOD COUNT BEGINNING 6,550
" " 1½ HRS. 7,250
" " END OF EXPERIMENT 8,050
B.M.R. BEGINNING +3.0
" END +3.5
ABDOMEN START 95.0°
" END 95.5°
RIGHT FOOT START 88.0°
" " END 95.0°
" HAND START 85.7°
" " END 95.0°
NOTE — A SLIGHT INCREASE IN TEMP. COULD BE DETECTED OVER HEART AREA DURING EXPERIMENT AMOUNTING TO ABOUT 1° F. ABDOMEN TEMP. REMAINED WITHIN 1° F. DROPPING SOMEWHAT WHEN ENERGY WAS TURNED ON & INCREASING WHEN ENERGY WAS TURNED OFF.
UPPER CURVE-TEMP. INSIDE WALL GLASS SPECULUM
LOWER CURVE-TISSUE TEMP.
PULSE IS INDICATED BY POINTS (BELOW)
TEMPERATURE F°
TIME-HOURS
TIME 3 HRS.
PULSE
OFF
COOLING RATE OF INSIDE OF GLASS SPECULUM AFTER TURNING OFF UNIT
COOLING RATE OF TISSUE AFTER TURNING OFF UNIT

Fig. 3. — Various physiologic reactions of one of the volunteer patients during an experimental treatment with internal radiant heat. Note the almost steppe-like rise of the temperature of inside wall of speculum with progressive increase in milliamperage. Note also the abrupt drop in temperature of both speculum interior and vaginal tissue upon switching off current.

ductivity ability is even less than that of asbestos.* Thus, without the ingenious creation of a greatly increased surface area (vaginal vault distention) for added conduction—absorption contact, this form of pelvic heating could actually not be as effective as a therapy.

There is, however, a physiologic argument against the use of vaginal inflation as a means of heating the pelvis. With inflammation, impairment of the flow of local circulation is natural. Inflation further compresses the already disturbed circulation. Effective deep tissue heating requires good superficial circulation.

The speculum described only mildly distends the vagina, and the mucous membrane can be seen at all times as a pink, highly vascularized tissue.

I believe that a moderate pelvic temperature which is prolonged and sustained has greater therapeutic value than critical or subcritical temperatures maintained for shorter periods. After all, the intended objective of any heat therapy is almost purely to accelerate circulation to its optimal

* Rubber has a thermal conductivity of .00045, water, at 20 C., .00143, air, at 0 C., .000056, whereas asbestos reputedly a good insulator has a thermal conductivity of .00019.

point. Nature never builds up critical temperatures (112 to 114 F.) under pathologic conditions. In fact, systemic hyperpyrexia at a temperature of over 107 F. usually causes destruction of both the pathologic condition and the patient. But if an infection or inflammation does not yield promptly to natural temperature, a sustained physiologic fever of moderate range may remain for days or weeks.

So it can be with controlled radiant energy. This induced form of heating may be continued for hours at 320 milliamperes. In some patients now under observation but not included in this report radiant energy has been applied for five hours at a time. The only intermission has been to allow the patient to empty the bladder. To allay restlessness, barbiturates were occasionally ordered. Most of the patients, however, have had little discomfort. Another series is contemplated in which radiant therapy is to be applied for ten to twelve hours.

LIGHT DISTRIBUTION IN THE SKIN

LAYER	λ mm	200	250	280	300	400	550	750	1000	(1400)	μμ
		100	100	100	100	100	100	100	100	100	APPLIED
CORNEUM	03	(100)	(81)	(85)	(66)	(20)	(13)	(22)	(29)	(56)	ABSORBED AND REFLECTED
		0	19	15	34	80	87	78	71	44	TRANSMITTED
+MALPIGHII	05	(0)	(8)	(6)	(18)	(23)	(10)	(13)	(6)	(16)	ABSORBED
		0	11	9	16	57	77	65	65	28	TRANSMITTED
+CORIUM	20	(0)	(11)	(9)	(16)	(56)	(72)	(44)	(48)	(20)	ABSORBED
		0	0	0	0	1	5	21	17	8	TRANSMITTED
+SUBCUTAN.	25	(0)	(0)	(0)	(0)	(1)	(5)	(20)	(17)	(8)	ABSORBED
		0	0	0	0	0	0	1	0	0	TRANSMITTED

	EXTREME U-VIOL.	FAR ULTRA VIOLET	NEAR U-VIOL.	VISIBLE VIOL. GREEN RED	NEAR INFRA RED	FAR INF RED
GENERAL REMARKS	All absorbed by corneum. No radiation reaching germinativum	Greatest absorption in stratum corneum. Some radiation reaches corium (papillare). No radiation reaches subcutaneous layers.	Relatively large absorption in stratum Malpighii.	Minimum absorption in stratum corneum. Most radiation absorbed in corium. Pronounced radiation reaching subcutaneous layers	Strongly increasing absorption in upper layers, decreasing in lower layers.	Practically no penetration

Fig. 4. — Light distribution in skin.
(A. Bachem, and C. T. Reed, Arch. Phys. Therapy, **12**:581 [Oct.] 1931.)

The apparatus is not cumbersome. The unit weighs less than 10 pounds. It is compact and can be transported with a minimum of inconvenience.

Because no intricate parts are necessary to establish and maintain variations of temperature, the cost of the unit and the cost of replacement should both be low. The life of the bulb is comparable to that of an ordinary electric light bulb.

Summary

The pelvic heating device described utilizes radiant energy as the heating medium. The entire unit weighs less than 10 pounds and can easily be transported. A treatment may be kept up almost indefinitely, certainly for three to ten hours, with the patient remaining reasonably comfortable, either sleeping, reading or knitting. The patient is able to assume almost any conventional position during therapy or can change from the supine to the prone position without the heating unit's being either removed or disturbed.

(Concluded on page 744)

ACTIVE EXERCISE IN FRACTURE TREATMENT *

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There is a simple physical agent—active exercise—that is often neglected in fracture treatment. Active exercise should be prescribed from the moment the fracture has been reduced, the method of fixation decided on and fixation effected. A fracture patient enters the hospital a broken man, not a sick man physically or mentally. The less he is put in the category of the sick patient and the more he is treated as a person who was well an instant before the accident and expects to remain well, the shorter will be the period in which he needs convalescent care.

Early physical therapy to the injured part, commenced on the day of admission if the patient is in a hospital, is a most important part of convalescent care. But there is much which can be called physical therapy that should be supervised by physicians and nurses as well as by technicians. Plaster has been applied to the forearm and hand in a Colles' fracture. Properly it extends to the metacarpophalangeal joints only, so that all fingers can be moved completely. Too often no one thinks to tell the patient to move his fingers. Weeks later a physical therapeutist works hard to gain recovery of a function which would never have been lost if some one had insisted on the patient's moving his fingers many times a day from the first day on.

At Beekman Hospital we have found class exercises of great value in the fracture ward. Because one leg is injured there is no excuse for allowing the muscles of the neck, back and three other extremities to deteriorate and greatly prolong the convalescence. Suppose on getting out of bed you will need to use crutches. Might you not prefer to have two strong arms and one strong leg to support you? Each afternoon one of our physical therapy technicians comes into the fracture ward, turns on a phonograph to march time and leads the men in simple calisthenics as they lie in bed or sit in a chair. All uninjured parts, or those not actually immobilized, are exercised by the whole ward together, with the technician actually instructing and leading; neck, back and the four extremities in segments. It was difficult at first with men who had never done such a thing. But once started it became a simple routine, since the new admission was ashamed not to play the game as he saw his neighbors doing. The men look forward to it now, and there is no doubt that it has helped the morale of the ward as well as its physical status.

The treatment in office or outpatient department often tends to be routine, e. g. "physical therapy three times a week," with a check-up by the physician every one or two to four weeks. Physical therapy can only help the patient to help himself. Many patients are never told that their half hour two or three times a week is but a minor part of their convalescent care. They need to be shown definite forms of exercise and urged to do these literally hundreds of times a day. If these can be purposeful occupations instead of mere calisthenics they are much more effective.

The fracture patient needs work therapy—not a vacation but a hardening process. Ways and means should be devised to keep his mind and body occupied from the start. He should not be treated as a

* Read at the Twentieth Annual Session of the American Congress of Physical Therapy, Washington, D. C., September 4, 1941.

star boarder but as a perfectly well man except for one cracked-up part. If it is brought to the nurses' attention and properly supervised, the patient can help with many things in ward work without disturbing the morale.

Occupational therapy needs to be introduced much more widely in general hospitals. There are several excellent schools training persons to teach this. The great difficulty is to keep it from developing into a routine rather than using imagination to make the best adaptation for the individual patient. Physicians in general cannot know how to do this, but they should recognize its value, know when it is well done and back it enthusiastically. Occupational therapy is many times more valuable than the usual types of physical therapy for these patients. Even without a trained instructor and a shop, much can be done in a simple way if some one is interested in doing it.

As an occupant of a general hospital the fracture patient is too often conditioned to become an invalid during his stay. Frequently he requires prolonged care to recover from his hospitalization rather than from his injury. A young man has done heavy labor in construction work for several years. He is a superb physical specimen, proud of his ability to lift more than any other man in the gang, proud of the wife and youngster at home and of the pay check he brings in each week. A sudden cave-in, a thigh pinned between rocks, an ambulance call, a hospital bed and a fractured femur. Can we justly place this man in the same group as one recovering from a severe illness? Rather we must try to keep his young, finely trained muscles and his care-free brain in as good condition for six to twelve months as they were two minutes before the accident occurred. This does not mean lying in bed for weeks gazing at the ceiling except at the periods when an attractive attendant serves his food and bathes him. He begins to worry about funds, the family, his injury, his job. Gradually he softens physically and mentally. The punch is gone. This hospital life is rather comfortable anyway. Let someone else worry about his family; he is not going back to work until he is absolutely fit. Besides, he has a good case against the company; didn't his lawyer say so? If we are not careful, even with a perfect surgical result our man is liable not to return to his work for three or four years, if ever. Let us not be a party to producing unemployment. This is not convalescence from a fractured femur but from a hospital stay, too often spent under conditions far more luxurious than those to which he has been accustomed. Our major effort in the early convalescent care of fracture patients should be made from the point of view of prevention of the need of convalescence from hospitalitis.

Special wards for fracture patients help greatly. It is not well for the man with a fracture to be in the same bed for three months while on each side of him one patient after another with an acute surgical condition comes in for ten to fourteen days and goes his way. It produces a feeling of frustration as he quickly becomes the oldest inhabitant of the ward. In a fracture ward he will encounter patients with different stages of similar lesions; one man is learning to use a walking caliper; another is just wrestling with crutches; one is being congratulated by his fellows on his first time out of bed in several weeks and another on having his traction wire removed. These men are all playing the same type of game and they encourage and train one another. The new patient, meeting for the first time a proposition about which he knows nothing, rapidly falls into the routine of a fracture ward, becomes interested in the progress of the others and looks forward to his being able to do these things himself as soon as possible. Further, he is a well man among well people. Years ago it was

customary to see a plaster spica applied, and then, as far as the visiting staff was concerned, the patient was passed over until the time arrived for removing the plaster. This is somewhat less frequent than formerly. Much harm to the patient results, and this is another valid reason for insisting on a fracture ward. Place a physician in charge who is really interested in fractures and you will see things begin to move. If your beds for patients with acute surgical conditions are clogged up with fracture patients, you may find out, while your visiting staff is greatly interested in abdominal work, that no one is taking responsibility for making certain that the fracture patient is having the advantage of the most up-to-date and speedy care.

Social Service

The social service department has a large opportunity in convalescent care while the patient is still in an acute surgical bed. Probably the patient had no neurosis at the time of injury, at least not one sufficient to keep him from working. Every effort must be used against his developing one during convalescence. What are his home conditions? What are the means of support of his family? Exactly what did his work consist of? Is the probability that he will be able to do precisely the same work? If not, with the type of mentality he has what work could be adapt himself to? Does his employer want him back, and can he expect an opening when he is ready to return? Is his family of the type which will baby him when he returns home and make him worse? If his injuries are severe and it is unlikely that he can return to a similar place in industry, is he a man who wishes to work or will he be satisfied to remain a cripple? Does he believe society owes him and his family a living whether he is working or not?

The social service status needs to be gone into and put in writing in the first few days after injury. No neurosis has been established then. This is the time to survey the problem as thoroughly as possible so that adjustments to his environment may be suggested before the problem really arises or becomes fixed in the man's mind. If we let the man who has always been a good worker become a social service problem, have we not much to answer for if we did not try to appreciate the gravity and extent of our problem in the first few days after injury?

Many persons seem to do excellently while hospitalized, but their whole mental attitude apparently changes shortly after discharge. Is it the constant solicitude of their family? Is it contact with an attorney? Is it the effect of a compensation board hearing? At any rate we should urge the social service department to do all it can in the early days to fortify the reaction of the patient against the effect of these contacts. We must accept a certain responsibility for allowing a well man to develop into a partial or complete invalid while convalescing under our care. We have no right to treat the injured part only and stop there.

Convalescent Care

Convalescent care in the outpatient department is a serious problem. In many instances the patient is seen by a different physician than attended him in the hospital, or even by a different physician each day. The patient often comes to question whether any one is really interested in his injury. Here again the social service department can accomplish much, by continuing the work which it started in the hospital.

I believe the ideal fracture treatment would be to institutionalize the patient from the time of injury until he returns to his usual work or to another job for which he has been rehabilitated. This does not mean that

he sleeps there or necessarily eats there. It would be an economy to all concerned if there was real supervision. At present such an arrangement is practically nonexistent.

It would mean that a well man coming to a general hospital with a fracture would not be treated as if he were ill but as a convalescent from the start. He would be taught how to use all joints and muscles in the region of immobilization, commencing on the first day. He would be started immediately on general exercise to preserve the musculature which he brought with him. He would be given a job to do while in bed which would occupy body and mind and make him feel he was still a part of a moving world. As soon as he was out of bed he would be taught some form of occupational therapy, if possible similar to the work he did before he was hurt. As soon as he is fit for discharge from the hospital he would be an ambulatory patient if his home conditions could possibly warrant it. If not, we should arrange for institutions where the injured are by themselves and where every one gets work therapy. This should also be true of our outpatient departments. The fracture patients should be gathered into the institutions where they can receive work therapy. This should be daily and for increasing time up to a full working day. At present the ambulatory patient receives the least supervision at just the time when guidance means the most to his future economic life.

I feel that, except in the case of the permanently crippling injury requiring a change of occupation, the convalescent care of the fracture patient could be much better handled with work therapy from the day of general hospital admission, with institutionalized supervision until he is again ready to work. We are wasting a tremendous amount of money and man power by treating a broken bone and letting a well man get sick physically and mentally while under our care. Then, after the damage is done, we spend months, years or a lifetime trying to bring him back to normal. The development of institutions adequately manned to furnish real work therapy is an urgent need in the proper care of the tremendous volume of injured persons.

115 E. 61st Street.

PHYSICAL MEASURES IN REHABILITATION *

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Physical measures are employed extensively in all Veterans Administration hospitals and outpatient departments for the treatment of a variety of diseases and injuries which occur among exmembers of the armed forces of the United States.

To those persons who have served in the armed forces of the United States the Veterans Administration furnishes hospitalization, domiciliary care and outpatient service for the treatment of disease or injury attributable to such service. The laws and regulations governing the operation of the Veterans Administration also authorize hospitalization and domiciliary care (with incidental medical treatment) of exmembers of the armed forces of the United States for the treatment not only of disease or injury determined as incurred or aggravated in military or naval service but also of disease or injury having no relation to prior military or naval service. Admission for hospital treatment or domiciliary care for a condition due to military or naval service is subject only to the requirement of an honorable discharge from the last period of war service or honorable discharge for disability in line of duty in peacetime service. Admission for a disability not attributable to military or naval service, however, is governed by certain requirements relative to length of service, financial ability of the applicant to defray the expense of the service, etc.

The majority of patients at present hospitalized in the facilities of the Veterans Administration are veterans of the Spanish-American War, the Philippine Insurrection, the Boxer Rebellion or the first World War. The veterans of the first World War form the largest group. They manifest a wide range of disabilities incident or subsequent to service. There are now in operation ninety-one facilities under the direct and exclusive jurisdiction of the Veterans Administration, and that total includes all facilities primarily for domiciliation (i. e. those formerly called "national homes"). On April 10, 1941 there were in the ninety-one facilities a total of 76,859 beneficiaries, of whom 16,517 were receiving domiciliary care and 60,382 hospital treatment. Over four million persons who have been discharged from the armed forces of the United States from service in wars, expeditions or peacetime service are potentially entitled to hospitalization and treatment by the Veterans Administration. This number will be augmented by the selectees, reservists, volunteers and National Guardsmen now in Federal service who will be discharged for disability in line of duty or be granted pensions for service-connected disabilities.

With the inception of the Veterans Administration, physical therapy departments were established in each of these hospitals and in some of the regional office clinics. These departments are equipped with all the approved and recognized physical modalities necessary to treat those patients for whom physical measures are indicated. The equipment in the various hospitals is set up according to the bed capacity and types of patients under treatment. Bed capacities vary from 250 to 1,600 or more, and the patients fall into three groups: neuropsychiatric patients, tuberculous patients and patients requiring general medical or surgical treatment.

* Published with permission of the Medical Director of the Veterans Administration, who assumes no responsibility for the opinions or conclusions drawn by the author.

* Read at the Twentieth Annual Session of the American Congress of Physical Therapy, Washington, D. C., September 1, 1941.

Every physical therapy department is headed by a physician in charge, who possesses an adequate knowledge of the various forms of physical therapy. The personnel of the department consists of a chief aide (or technician) and staff aides (or technicians) in sufficient numbers to handle the patients referred for treatment. The departments are kept up to date by the purchase of new equipment to replace unserviceable equipment and by the purchase of additional modern equipment which has been approved by the Council on Physical Therapy of the American Medical Association. All physical therapy treatments are administered by well trained and competent staff aides, who qualify under the United States Civil Service Commission for their respective positions. The work is supervised by a chief aide, who is responsible for the carrying out of the proper technic of application in each individual case. The physical therapy prescription is ordered by the ward physician, who has direct charge of the patient. The prescription is checked and reviewed by the physician in charge of the physical therapy department, who approves and countersigns it before any treatment is administered.

A copy of the printed form at present in use in all Veterans Administration facilities for prescribing and for checking the treatments received is shown in figure 1. This form is complete and detailed and covers every type of physical therapy in its proper grouping. It is one of a series of medical forms designed to become a part of the patient's permanent clinical record. In addition, a clinic card is kept for each patient, showing the number of treatments, dates, diagnosis, etc. This card is kept on file in the physical therapy department for two years.

The great number of war injuries and diseases during and following the first World War served as an unprecedented opportunity for the use of physical measures designed to rehabilitate disabled men. The use of physical methods of treatment has greatly increased from the first World War to the present time.

In the early days the use of physical measures in the treatment of disease was looked on with a great deal of skepticism. Progress was also hampered by false claims, fallacies and misconceptions. The present day concept of the value of physical measures is based on laboratory and clinical studies. Perfected technics of application of the various physical modalities are today employed in the treatment of definite pathologic processes. Physical measures of treatment form the base of the therapeutic triangle with medicine and surgery and constitute an essential adjuvant in the rehabilitation of disabled men and women.

Diathermy, both conventional and short wave, is the treatment of choice for patients suffering from trauma of the soft parts, bones and joints inflicted by gunshot and all types of projectiles, including bursting shrapnel and high explosive shells. This type constitutes a large number of the injuries in patients under treatment by the Veterans Administration, in whom injury to both soft and osseous structures was nearly always attended by functional loss and even loss of limb. Fractures of all types at the point of impact of shot or shell were numerous and presented many complications due to infection of soft parts and bony substance. In many patients osteomyelitis in varying degrees developed and required prolonged adjuvant treatment by diathermy, radiant light and heat and ultraviolet rays. Wounds about the joints presented complications due to damage of muscles, tendons, nerves, blood vessels, bursae, periarticular membranes and intrinsic structures. A large number of these injuries involved peripheral nerve paralysis, with wrist and foot drop, muscle atrophy, adherent scars, loss of sensation and impaired blood supply. These injuries required prolonged and careful treatment with radiant light and heat, massage, exercises and use of the interrupted galvanic current for motor point stimulation followed later by application of the slow and surging sinusoidal current to develop muscle tone and strength. Muscle and nerve tests are routinely performed in cases of nerve injury or suspected nerve involvement, the faradic and galvanic currents being used. These

tests are done also on patients suspected of malingering and on neurotic patients who claim impaired motion in their extremities.

Deeply penetrating wounds produced compound fractures and dislocations of joints, with fissures extending into the joints and erosions of the articular

VETERANS ADMINISTRATION
Medical Form 2614 m
(Revised July 1939)

PHYSIOTHERAPY CLINICAL RECORD

Diagnosis _____ Ward _____

Condition to be treated _____

Notes on physical condition, heart, X-ray, etc. _____

Date _____ Prescribing physician _____

PART TO BE TREATED		MONTH
Thermo-Therapy	Infrared	
	Luminous	
	Cabinet (Sed.–Stim.–Elim.)	
Hydro-Therapy	Needle shower	
	Scotch douche	
	Whirlpool	
	Sitz bath	
	Pack (Cold–Neutral–Hot)	
	Continuous bath	
Actino-Therapy	Mercury arc (AC–WC)	
	Carbon arc	
	Heliotherapy	
High-Frequency	Diathermy (Conv.–S. W.)	
	Autocondensation	
	Monoterminal	
Mechanical	Massage (Sed.–Stim.)	
	Vibration	
	Exercise (Act.–Pas.)	
Electro-Mechanical	Sinusoidal	
	Galvanic	
	Static	
Electro-Chemical	Galvanic current	
	Ionizing dose	
Special	Muscle and nerve test	
	Pos.–Neg. pressure	
	Artificial fever	

Clinical progress _____

Physician in charge of physiotherapy.

Completed by _____ Aide
(Initials only)

Reading aide.

(Surname) (Given name) (Cl. of Ben.) (Comp. No.) (Reg. No.)

PHYSIOTHERAPY 16—11560 U. S. GOVERNMENT PRINTING OFFICE

Fig. 1. — Form in use in all Veterans Administration facilities.

surfaces as well as general involvement of the whole joint substance. The patients were benefited by application of diathermy over the entire joint, together with massage and graduated exercises, to restore normal joint action and function. These treatments were given in conjunction with indicated orthopedic surgical measures and the use of orthopedic appliances for adequate immobilization and support. It is of prime importance that physical therapy be instituted

at an early stage in the treatment of all such patients. This is essential, not only to secure immediate relief for the patient but to limit functional loss and ultimately to produce maximum restoration of normal motion.

There is a large group of arthritic patients in the general medical and surgical facilities, a great majority of whom are referred at some time during their period of hospitalization to the department of physical therapy. In general, physical measures producing heat may be administered by a number of means, e. g. infra-red rays, conventional and short wave diathermy, light cabinets and hydrotherapy in the form of the sedative needle shower, the scotch douche and hot whirlpool baths. Treatment by these means is followed in most cases by sedative massage and active and passive exercises. Some arthritic patients who have shown resistance to the usual methods of treatment, particularly those who have swelling and pain, have been treated with mecholyl chloride administered by the method of ion transfer. The technic recommended by the Council on Physical Therapy of the American Medical Association* is as follows:

> The active electrode should consist of material such as asbestos cloth, cotton gauze, stockinet or other suitable fabric resistant to tears, saturated with a solution of the desired medicament [0.2 to 0.5 per cent solution of acetyl-beta-methylcholine chloride (mecholyl chloride)]. The saturated fabric is wrapped closely around the part to be treated, and a strip or sheet of metal foil cut to the appropriate size and shape is wound over the fabric. The positive pole of the current source is connected to one end of the metal strip which is used to conduct the current evenly over the entire area treated. The negative pole is connected to a dispersive electrode applied to the patient's back, which completes the circuit. The dispersive electrode consists of a large, flat, moistened pad measuring about 10 by 12 inches. The direct current should be turned on and increased gradually until the desired milliamperage is reached, so that unpleasant effects caused by sudden increases are avoided. The rate and amount of the ion transfer may be regulated by the strength of the current and the duration of its flow respectively.
>
> Individual tolerance to the treatment should serve as a guide in determining the strength of the current to be used. The initial treatment should not exceed 5 or 10 milliamperes for thirty minutes. At the conclusion of a treatment the current is reduced gradually to zero reading and turned off. The patient should remain quiet and warm for thirty to sixty minutes following a treatment; after this period he may resume his usual activities. Each treatment should be restricted to a limited area, such as one hand or one joint when several parts are involved. Three or four days appear to be the most satisfactory interval between treatments.

This form of treatment reduces swelling and lessens pain in and around the joint structures.

Physical therapy is merely an adjunct to other treatment of arthritis and given alone does not produce the best results. However it has been found to be extremely valuable and indeed the most important single procedure used in the treatment of chronic infectious arthritis. In this disease its chief value is to produce an increased flow of blood to the affected areas, which aids in the removal of waste products and hastens the absorption of inflammatory exudates. It also serves to increase local nutrition, relaxes muscular spasm and often relieves pain, thereby permitting exercise, which is necessary to prevent complete ankylosis.

Hydrotherapy, both local and general, is given to many of patients with excellent results, particularly in the neuropsychiatric facilities, where 50 to 60 per cent of the patients receive some form of hydrotherapeutic treatment. Hydrotherapy is applied locally in the form of hot or contrast whirlpool baths for peripheral paralysis, circulatory disturbance, painful postoperative scars, edema, recent sprains, contusions and fractures of the extremities. The applications are usually followed by underwater massage and exercise or the slow or rapid surging sinusoidal wave to relieve stasis and assist local elimination and

* Ion Transfer (Iontophoresis) Klumpp, T. G., and Carter, H. A.: J. A. M. A. 117:360 (Aug. 2) 1941.

metabolism. The sitz bath, hot, neutral or cold, is utilized in many postoperative rectal, anal and perineal conditions to assist healing and to relieve swelling, congestion and pain.

General hydrotherapy in the form of warm baths, needle sprays and the scotch douche is given for stimulating, sedative and eliminating effects in many cases in which tonic and up-building therapy is required and in cases of psychoneurosis of various types.

Local ultraviolet irradiation, with either a water-cooled or an air-cooled lamp, is given with impressive results in the treatment of some dermatologic conditions, sluggishly healing ulcers, postoperative wounds, cervical adenitis and tuberculous ulcers of the mouth, tongue, larynx and pharyngeal regions.

Ultraviolet rays administered in the proper dosage have been found to be a specific for erysipelas and herpes zoster. The technic employed in treating erysipelas is the same as that advocated by Dr. Norman Titus: exposure of the affected areas, the surrounding healthy tissues being protected, ten times the erythema dose being given with a water-cooled or an air-cooled quartz mercury arc lamp. The technic for treating herpes zoster depends on the severity of the rash, but a well defined third degree erythema must be obtained.

General tonic doses of ultraviolet rays are given to promote metabolism. These act favorably on the blood chemistry in run-down and anemic persons and also have been found to act favorably in patients with gastric and duodenal ulcer who are slow in regaining their strength and have varying degrees of anemia from loss of blood and from dietary restrictions. This form of irradiation is merely adjuvant treatment, although I have noted good results in a considerable number of patients with gastroenterologic conditions. The technic employed is to give very mild suberythema doses of ultraviolet rays at first, gradually increasing the dose until a good tan is obtained. Treatments are given daily at first and are given in conjunction with the routine ulcer regimen and dietary management.

At one of the Veterans Administration facilities for the treatment of tuberculosis, laryngeal tuberculosis has been successfully treated by carbon arc lamp irradiation with a special applicator consisting of a glass mirror for use by the patient to observe his throat and a reflector for reflecting and focusing the rays onto his laryngeal mirror and thence to the larynx.

Many patients with peripheral vascular disease are benefited by suction and pressure treatment combined with other indicated measures. In order that the best results may be achieved from physical therapy, all patients with Buerger's disease, peripheral arteriosclerosis, thrombosis or frostbite are instructed in hygienic care of the extremities and the necessity of refraining from smoking. These patients are also given instructions in the carrying out of Buerger's exercises as part of their treatment.

The following combination of physical modalities has been found to be effective: suction and pressure therapy, preceded by contrast baths with warm water at 103 F. for four minutes and cold water at 60 F. for two minutes. For patients with ulceration, luminous heat radiation and subminimal doses of ultraviolet rays have proved to be effectual. The best results have been obtained in the treatment of recent thrombosis and of frostbite in all stages. Some patients with Buerger's disease or arteriosclerosis have also shown improvement and have become ambulant after having been bedridden or confined to a wheel chair for months.

Several years ago, physical therapy departments in many facilities were equipped with short wave generator machines of dual capacity types, thus making it possible to give short wave therapy by the four recognized means of application, namely: (1) pad and cuff electrodes, (2) air space electrodes, (3) induction coil and (4) metal contact electrodes. Short wave therapy is applied wher-

ever a deep heating effect is therapeutically indicated. Short wave diathermy has replaced to some extent long wave, or conventional, diathermy and other less effective forms of producing heat in living tissues. It has the advantage of being quickly and easily applied to all parts of the body. Treatments also require less time. Short wave diathermy has been found to be a safe and effective means of applying heat in the treatment of acute, subacute and chronic inflammatory processes.

It is preferred to conventional diathermy in the treatment of all traumatic conditions. Its prompt deep heating effects are preferred to other local heating effects in the treatment of disease or injury to deep-seated organs, intrinsic tissues and bone and joint structures.

Short wave diathermy in the treatment of nasal sinusitis gives prompt relief in the acute and subacute stages but does not materially benefit the patient with a chronic condition except during an acute exacerbations. The patient with allergic or hyperplastic sinusitis is not usually benefited.

Short wave diathermy is considered superior to other local heating agents because of its deep local heating effect, which promptly establishes, or improves and maintains, drainage, thus giving prompt relief of pain.

It has been observed clinically, however, that conventional diathermy usually gives better results in cases of neuritis, especially sciatic neuritis. Some contraindications to short wave diathermy are:

1. The presence of a condition in which there is marked vasodilatation, the possibility of hemorrhage is increased or a sudden increase in circulation may embarrass the cardiovascular system.

2. The presence of an acute inflammatory condition in which absorption would spread the infection to vital structures.

Applications to the heart and brain areas, unless very mild and of short duration, should be avoided.

Fever therapy has been used in only a few of the Veterans Administration hospitals in the treatment of dementia paralytica, asthma and gonorrheal and infectious arthritis. The reports have been favorable, and in some instances the results have been impressive, although no definite conclusions have to date been drawn. However, the Veterans Administration has recently made plans to establish a full and complete fever therapy department in one of the large neuropsychiatric hospitals in order to study and observe hyperpyrexia treatment in certain neurologic conditions.

Conclusions

1. Physical therapy considerably shortens the period of treatment of hospitalized patients.

2. Physical measures when applied in the early stages of disease or injury have been found to be extremely valuable in early rehabilitation, with restoration of normal function.

3. Physical measures are rarely used alone; they are usually employed in conjunction with indicated chemotherapy, surgical measures and the use of orthopedic appliances in order to obtain the best end results.

4. Emphasis is placed on the constant accuracy of technic in the application of all physical modalities.

5. Physical measures have contributed greatly to the care and treatment of various types of patients by decreasing disability and restoring function to the maximum degree.

6. Physical forms of treatment when used with other recognized procedures have been found to be of inestimable value in the facilities of the Veterans Administration in rehabilitating war veterans suffering from various diseases and injuries.

Discussions of Papers of Drs. Charles R. Brooke and Walter S. McClellan *

Dr. Euclid M. Smith (Hot Springs National Park, Ark.): As brought out by Dr. McClellan, the health resort facilities in the United States can be of equal importance to the civilian population as well as to the military forces in organizing medical resources of a wartime basis.

The keynote of medical preparedness is the utilization of every possible medical resource and then proper organization in such manner that the individual physician can handle the maximum number of patients with a minimum amount of effort, and it is, therefore, important that each hospital bed in this country be used to its fullest extent. Therefore, the point that Dr. McClellan brought out concerning the use of health resorts as a place for convalescents is significant, not only from the standpoint of increasing our present hospital capacity, but also of decreasing the period of convalescence for many patients. Also, this plan would increase the efficiency of physicians in the congested centers, because they would have to spend but little time with convalescing patients.

As Dr. McClellan further brought out, this utilization of health resort facilities was proven of value in the last war, and there is no doubt that these facilities are being used to the fullest extent by the warring nations of Europe today. As the United States swings into wartime production, more and more demands will be made on all our people, and the strain of this increased physical and mental effort will bring about certain medical conditions which can best be treated at spas, particularly those conditions which are benefited by a regimen based on rest and increased elimination.

Dr. McClellan has mentioned the American Medical Association Committee on Health Resorts. The work of this Committee is going forward at a rapid rate; accurate information and data are being collected and assimilated, and soon, for the first time in the history of this Nation, a comprehensive survey of American health resorts will be completed.

Dr. Charles I. Singer (Long Beach, N. Y.): After listening to Dr. McClellan's presentation I am happy in the realization that the poorly neglected American spas have finally found a fighting champion. I come from Europe, the continent of 1,000 spas, the fame of which is based on empiricism rather than on scientific investigation. I found the American spa just as sorely in need of scientific supervision and lacking even in the fundamentals of research.

The trend is changing, and the Spa Committee of the American Medical Association, of which Dr. McClellan is the acting director, has a leading role in this change. Dr. McClellan offers a hundred spas with 60,000 accommodations to the organizers of American medical preparedness. He classifies the spas according to accommodations and services rendered, describes indications, emphasizes the importance of medical supervision, and depicts the relation of spas to medical preparedness.

The United States possesses within its boundaries all of the climate variations from sub-arctic to tropical, high altitude, desert, and seashore climate. If the medical men were able to utilize climatic change in the treatment of the chronic sick, the convalescent, and the invalid, care could be given in this country to the wounded and sick soldiers and workers of all the nations of the world.

Climate change should be an important consideration in selecting a spa. This naturally is not important in the summer, when the climate of the entire country is nearly uniform, but the need for spa treatment should not be confined to the summer months.

In my opinion, September and October are the best months at Saratoga Springs, because of the tonic qualities of the autumn air together with the spa regimen. This is especially true so for the exhausted chronic sick of the southern states.

I am convinced that if due scientific consideration is given to the climatic qualities and possibilities of a spa in the fall months, the short duration of the season of American spas would be considerably lengthened.

Whether at peace or during war, the future will bring to the fore the importance of spa therapy for children. The American spa is not equipped to take care of children. Noticeable improvement in the physical condition of under-developed, anemic children resulted from medically supervised vacationing on the seashore.

Vacationing in the fall months in the seashore climate with open air exposure and surf bathing is an ideal method of hardening and seasoning troops, and building an effective fighter out of a convalescent.

I am certain Dr. Brooke's presentation was a revelation to everyone. The veterans hospitals are the cause of one surprise after another to me. In the winter of 1939-1940 I took a six months vacation in order to get first hand information about the winter climate of the southern states of the Union.

Often I stopped for a few days to enjoy a salubrious spot, and wondered why its climatic advantages were not utilized in the treatment of the chronically ill. Whether it happened in Florida, Texas, Arizona, or California, without exception I was able to find a veterans hospital in the neighborhood.

Whoever selected those locations deserve credit. Then, I wondered whether those hospitals utilize the fortunate advantage given by their location in the treatment of disease, or are they only places for convalescents.

We received the answer from Dr. Brooke's article, and I am glad to know that the institutions described are strong fortresses of physical therapy.

* Paper of Dr. Walter S. McClellan appeared in the November, 1941, issue of the ARCHIVES.

I would like more information concerning contrast baths for peripheral vascular disease. He advocates a contrast of 45 degrees in temperature, which I think would prove beneficial in incipient cases with prodromal symptoms such as mild and occasional paresthesias, marble skin, cold hands and feet.

I wish to ask Dr. Brooke if he uses contrast baths at the height of disease, when blood vessel spasms on minor stimulation are so prevalent and so to be feared. As I know, one of the most important criterions of therapy in vascular disease is whether it elicits paradoxical blood vessel spasms. I would be reluctant to give them to my acute patients.

Dr. F. J. Scully (Hot Springs National Park, Ark.): At Hot Springs National Park, we have the facilities that Dr. McClellan mentioned for treating over a thousand patients. Last year over 750,000 baths were given to about 75,000 persons, which is an average of about ten baths per person.

In addition to the public bath houses the Army and Navy Hospital has its own facilities for giving baths to the Army and Navy personnel, to ex-service men, and to those who are sent through the Veterans' Bureau. They are using those facilities now, and could enlarge them if the demand became great, or if a national program of utilizing spa therapy to a greater extent continues.

Dr. J. W. Torbett (Marlin, Texas): I live at Marlin, and, of course, appreciate very much this discussion by Dr. Smith and Dr. McClellan on a subject of so much importance to people who are chronically ill or who have injuries that need healing.

The late Dr. Bernard Fantus, three years ago in the *Journal of the American Medical Association* had a splendid article on "The Insufficiently Patronized Health Resorts of the United States." He said they were better equipped and, in many instances, had better facilities and had better water than many of those in Europe, especially in war-time conditions, and yet people would still go to Europe. Of course, this has stopped because it is too dangerous. We have in the United States facilities which can be used in war-time and we have the patriotism to use them.

Psychology is the first step, and physical therapy methods the second, and the general trend of optimism that is present in these institutions where everybody goes for the definite purpose of getting better, or of getting rid of his trouble, promoting elimination, being placed on the proper dietary regimen, along with the physical therapy methods which are used at all of these resorts I presume, is of great aid to these people who are chronically ailing or who are recovering from injuries.

In our institution at Marlin we can take care of probably 15,000 to 20,000 patients a year. We have ethical clinics and medical directors at all the institutions, and we have hospital beds for about a 100, 35 of which are for crippled children.

During World War I, physical therapy was the means of returning wounded soldiers to duty much more quickly than ever done before.

Dr. Walter S. McClellan (closing): I want to take this occasion, in view of the fact that practically all of the discussion has been referred to the activity at the spa, to compliment Dr. Brooke on the breadth of his presentation on rehabilitation. All spa therapy has a real place in the program of treatment, but as Dr. Brooke has emphasized, it must be considered as a part of the whole therapeutic program. Since the sojourn at the spa is relatively short, there is the need for a coordinated program of treatment when the patient returns home. That is why I feel that the presentation of Dr. Brooke today has contributed materially to round out this discussion on rehabilitation and medical preparedness.

Dr. Charles R. Brooke (closing): I regret that Captain Stephenson was not present to discuss my paper, because he was formerly with the Brooklyn Naval Hospital and had a great deal to do with the development of the physical therapy department of that institution.

I have nothing to add except to give a few statistics as of June, 1941, when 211,956 of our patients were under treatment with physical measures throughout the country. There were 279 staff technicians or aides and, in addition there had been trained 50 physical therapy attendants who were working in the neuropsychiatric hospitals, which made a total of 329 persons working in these physical therapy departments.

EVALUATION OF SHORT WAVE DIATHERMY *

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The object of this presentation is to evaluate as far as possible, in the present state of knowledge, the clinical results and the scope of applicability of short wave diathermy. The introduction of "short wave therapy" — as it is still called by many clinicians abroad — some thirteen years ago by Schliephake attracted worldwide medical interest. Short wave apparatus came into extended use in all parts of the globe, and the manufacture of conventional, or long wave, diathermy apparatus ceased practically over night. Short wave enthusiasts abroad and in the United States asserted that these waves are different from all other physical therapeutic agents and especially from long wave diathermy. So it is no wonder that in the early literature one reads statements like this: "It is no exaggeration to call short wave diathermy the greatest discovery of physical medicine since the work of Roentgen." Or: "Every normal tissue cell has a radio frequency of its own, and by application of short waves of proper frequency, any abnormal tissue may be restored to function."

In the world literature there are now some 700 reports of biophysical studies on the various effects attributed to the new therapeutic agent, and I am fully aware of the difficulty of considering adequately all aspects of the subject within the limits of this presentation. Interestingly enough, the task is lightened by the fact that so far as clinical usage is concerned the number of reports is relatively small.

The basis of the clinical applicability of any new therapeutic agent must be the knowledge of its specific effects and their relation to the effects of similar therapeutic agencies. Considering the physical basis of short wave diathermy, as one passes in review the different frequencies of the electromagnetic spectrum there occur gradual changes in the biophysical effects of these electromagnetic waves. One must assume by this analogy that there must be some change in the penetration and absorption of the ultra high frequency range of ten to fifty million oscillations per second, corresponding with short wave diathermy, as compared with the high frequency range of around a million a second corresponding with long wave, or conventional, diathermy and that consequently there may be a difference in the physiological effects on normal as well as on pathologic tissues and fluids within the body.

The most striking physical property of ultra high frequency oscillations is their ability to pass through electrically conductive tissues as well as poor conductive tissues. Because of the difference both in their initial propagation through the air and other insulators and in their passage through tissues, they allow, in many cases, a simpler and more convenient method of application and also, in some instances, treatment in locations or conditions to which the older method is not safely applicable. Pätzold[1] stated that because of both "conductive" and "capacitative" heating by short wave diathermy, parts of the body which are closed off with poor conductors (fat, bones and so on) such as inner organs, the spinal cord and the brain, share in absorbing the electrical energy and hence can be warmed without overheating of the good conductive tissues which lie around them. This occurs especially with the shorter wavelengths below 10 meters. However, the wavelength per se is not a marked factor in tissue heating

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in the living subject, as shown by Coulter and Osborne[2] in their extensive studies of the heating effects of the wavelengths from 6 to 25 meters, because differences in machines, the energy delivered to the patient and the technic employed exert an equally important if not decisive role.

While there is enough proof theoretically and experimentally that the absorption of short wave diathermy by the tissues is somewhat different from that of long wave diathermy, the sum and substance of painstaking observations and counterobservations, abroad and in the United States, has made it clear beyond doubt that short wave diathermy is primarily a specific form of heat therapy.

In attempting to evaluate the present day uses of short wave diathermy, I shall endeavor to consider the following pertinent questions:

1. The so-called specific effects of short wave diathermy.
2. The relation of the technic of short wave diathermy to that of long wave diathermy.
3. The clinical applicability of short wave diathermy and its relation to long wave diathermy.

1. Specific Effects of Short Wave Diathermy

Selective thermal effect by various frequencies of short wave diathermy at certain depths and on certain tissues has been a subject of much investigation. The original report of McLennan and Burton[3] stated that for a given wavelength there is a maximum heating effect which has a definite relation to the specific conductivity and the dielectric constant of tissues. However, it was correctly pointed out by Mortimer[4] that the blood flow and the rapid interchange of heat in the living body may render the differences in temperature negligible for all practical purposes. Schaefer[5] found that the only instance of practical import in which distinct variation may exist between the various body tissues is that encountered in fatty tissue, in which overheating may be avoided by using the shortest possible wavelength.

Specific bactericidal action was claimed in the early reports of Haase and Schliephake,[6] but subsequent investigations have failed to corroborate such effects. Ozzano and Re[7] found with several species of pathogenic bacteria that short wave irradiation sometimes stimulated and sometimes inhibited their development, and they concluded that short wave diathermy exerts no selective specific action on bacteria but acts abiotically by heating the bacteria's environment. Hasche, Leunig and Loch[8] reported similarly.

Schereschewsky's original communication reported on specific biologic effects on tumors, and subsequently similar claims were made by Reiter.[9] H. and M. Langerdorff[10] repeated Reiter's experiments on induced tumors and refuted the theory that certain wavelengths have a specific action on tumors; they also found that any effect on tumor tissues is due solely to a rise in temperature in them, and they concluded that better results may be expected in the treatment of malignant tumors by combined short wave and roentgen ray therapy. On the other hand, Baumeyer[11] showed that coincident short wave and roentgen ray treatment can lead to the enlargement of malignant tumors, and short wave therapy is therefore contraindicated for malignancies.

The so-called athermic effects ascribed to short wave diathermy have given rise to considerable confusion. Some observers identified them as the result of such homeopathic doses as those delivered by Weissenberg's[12] apparatus of 1 watt output, which may be aptly characterized as heatless heat; it appears fairly evident that whatever clinical effect occurs in the wake of such hyperdiluted dosage must be due chiefly to suggestion. On the other hand, there has been shown some biologic proof that there is a possibility of some electrospecific effects.

Nonthermic changes induced in colloid particles by an electric field are proved, according to Krasny-Ergen,[13] by the fact that their manifestations are dependent on the direction of the electric field. Muth[14] observed earlier that in the alternating current field "pearl chains" are formed in fat emulsions and in the blood by the line-up of their central parts parallel to the electric field. The same phenomenon occurs with ultrashort waves of relatively weak energy, excluding the thermal effects which would make the globules boil. Liebesny[15] was actually able to photograph these effects in films. The existence of a specific nonthermal effect of alternating currents which takes a particular course in the short wave field must therefore be considered possible, although so far it has no practical clinical meaning.

Summing up all the evidence available at present, it would appear that, aside from the possibility of the last-named specific electric changes, thermal effects are the only proved biophysical effects of short wave diathermy. The diversity of opinions and some of the conflict in the experimental and clinical findings can be attributed to two factors. One is the undoubted lack of training in biophysical research of some of the investigators. The other is the lack of a generally accepted method of dosimetry. In order to be able to compare results in intricate biophysical research, one must recognize the elementary biophysical law of a minimum energy threshold as well as an optimum dosage for certain effects, and one must also be able to employ comparable amounts of energies.

2. Relation of the Technics of Short Wave and Long Wave Diathermy

Short wave diathermy offers some unquestionable advantages in its technic over long wave diathermy. The first is the introduction of the principle of air spacing. It has made possible the treatment of locations where bony prominences and other irregularities make the smooth application of metal contact electrodes impossible. The same principle also allows application over wounds, ulcerated surfaces and superficial sites of inflammation.

The second new principle is the development of the method of coil field heating, or inductothermy. This makes possible the efficient heating of the soft parts of an entire extremity or part of it; it has also brought about the development of the pancake, or treatment drum, technic for the convenient heating of almost any body surface and the underlying soft parts. These new technics have also served to make high frequency fever treatment more efficient and more safe.

Because of the absence of direct contact on the skin and the interposition of dielectric materials with the condenser pad technic, the employment of short wave diathermy is much more comfortable to patients, who like the smooth form of heating and do not miss the faradic sensation which occurs not infrequently with long wave diathermy. The method is also much safer, and the formerly more prevalent burns of the skin with long wave diathermy have become an exception with short wave diathermy. However, a minor new element of danger has been introduced by the possibility of arcing and burns from the overheating of metal objects near the electrodes or cables and from accumulation of moisture under the electrodes. It is, of course, sheer folly to assert, as early enthusiasts did, that it is safe to apply short wave diathermy to the clothed body, for this violates the elementary rule of safety that all parts should be closely inspected before and after the treatment.

A definite drawback to the technic of short wave diathermy as employed up to the present time is the lack of guidance to dosage other than that supplied by the patient's sensation. In long wave diathermy, the milliampere meter gives a reliable estimate of the strength of the current passing through the area under treatment. The meter in short wave diathermy serves primarily as an indicator that electrical energy is passing; it will also indicate that at a certain position of the controls — when the patient's circuit is "tuned" to the main oscillator

circuit — there is a maximal flow of energy in the treatment field. But it does not register the amount of energy passing through the patient. Efforts have been made to construct "dosimeters" for short wave apparatus, chiefly on the principle of measurement of power absorption by the patient.[16] Unfortunately, the clinical use of these devices has made little headway. It is absolutely essential for the intelligent and efficient administration of short wave diathermy that some method of dosimetry be finally agreed on. However, this opinion does not seem fully shared, for even Schliephake in his latest paper[17] did not mention dosimetry at all and only repeated his often made statement that clinical experience is necessary to determine adequate dosage. Schmitt,[18] of Chicago, uses only a watt meter to learn the total power input and relies on clinical judgment to determine the intensities suited to the different variables in each instance.

Proper spacing of condenser electrodes offers another minor problem. Depending on the output of the apparatus with the longer wavelengths, less spacing even to the point of contact is essential, while with shorter wavelengths deep heating requires more skin-electrode distance. This regulation is often only a matter of conjuncture. It is also a fact that with an increasing electrode distance a large amount of irradiation into space and waste of energy results. Generally speaking, therefore, for deep heating with the shorter wavelengths, apparatus of larger wattage output is necessary to furnish sufficient energy. However, it has been shown by Kowarschik[19] and others that increase of spacing acts as a virtual enlargement of the electric field and that the same effect can be accomplished by increasing the size of the electrodes.

I have found a partial solution of the problem of spacing and of that of the measurement of doses by the employment of metal contact electrodes, as described in a previous paper.[20] With this arrangement there is a minimum of radio interference because all energy is transferred to the patient, and likewise energy radiation from the cords to metallic objects in the vicinity and from one cord to another no longer occur and the danger of overheating the cords and burning adjacent inflammable objects is obviated. Finally, it is possible to use a milliampere meter on the patient's circuit for direct measurement of the short wave energy, as in long wave diathermy.

3. Clinical Applicability of Short Wave Diathermy and Its Relation to Long Wave Diathermy

Since the established uses of long wave diathermy are principally in the treatment of subacute and chronic inflammations of the deeper tissues, inner organs, bones, joints and bursae, it is to be expected that short wave diathermy should prove useful in the same conditions. This has been corroborated by extensive clinical experience, and in many cases nowadays the two forms of diathermy are used interchangeably. A statistical survey of a group of approximately 100 patients with traumatic, gynecologic and arthritic conditions in my clinic two years ago[20] showed about the same average in clinical results and number of treatments. Delherm and Fischgold,[21] of Paris, likewise reported that in the treatment of the majority of conditions similar results are accomplished by the two methods. With reference to gynecologic conditions there are several reports (Kovesligethy-Buben,[22] Watters,[23] Otto[24]) stating as an advantage of short waves their applicability and efficiency in the treatment of acute conditions, whereas long wave diathermy is only indicated for chronic conditions. The difficulty is, of course, that there are no means available to compare exact doses.

Acute inflammatory conditions for which long wave diathermy has been generally considered contraindicated appear to offer a special field of applicability for short wave diathermy. In purulent infections of the skin, such as furuncles, carbuncles, as well as in axillary sweat gland infections, in paronychia, dental

abscesses, and finally, in lung abscesses, remarkable sedative and absorptive effects of short wave diathermy have been reported by Schliephake[25] and many of his followers. They have been corroborated in cases of facial furuncles and other skin infections by American observers, such as Egan,[26] Kobak,[27] Brugsch and Pratt,[28] and Schlaepfer.[29] Special emphasis is laid by all these observers that only mild doses of short wave energy are to be used. Because of this unanimity of opinion of those who actually treated such patients, one may well accept these reports. Regarding lung abscesses, Brugsch and Pratt[30] conclude that the beneficial effect claimed on acute conditions are still undecided. Undoubtedly the question of appropriate dosage is a factor in comparing results and it cannot be solved before there is a generally accepted method of short wave dosimetry.

There is no adequate explanation available as yet of the beneficial effect of short wave diathermy on acute inflammatory conditions. A number of clinicians such as the late Cumberbatch,[31] Delherm and Fischgold and the author have emphasized that a mild heating from various sources, such as radiant heat, etc., has always given relief in acute inflammatory conditions. Cumberbatch actually applied mild doses of long wave diathermy by direct plate contact and claimed good results. It is a fact that with the air spaced technic of short wave diathermy, as a rule mild heating is applied which is well tolerated and beneficial in acute cases. Long wave diathermy with the contact plate method results usually in more intense heating, better suited to chronic conditions.

In the light of the present knowledge, acute inflammatory conditions are the only ones in which short wave diathermy may be considered to be definitely preferable over long wave diathermy. In all other conditions either method can be employed. Because of convenience of application, short wave technic may be preferable for certain locations or conditions. For instance, inductance coil heating is convenient in peripheral vascular conditions for gentle heating effect on account of easy controllability and the avoidance of skin contact; also for treating two knees simultaneously. In conditions of the head sinuses and for facial involvements, the spaced air plate or treatment drum method of short wave diathermy is convenient and safe.

On the other hand, long wave diathermy or the contact plate method of short wave diathermy seems preferable in all conditions where the spreading of lines of force and unnecessary heating of adjacent structures is to be avoided. Short wave diathermy as usually applied with large size electrodes or with an inductance coil results in a great deal of wasted energy and makes patients who are sensitive to heat feel uncomfortable. The clinical experience of the author and of others has shown that the contact plate technic is more efficient in treating superficially located muscles and bursae, many of the joints and the cervical spine, because it allows better localized heating. It still appears to be the method of choice for orificial treatment of the pelvic contents. Long wave diathermy as well as the contact plate short wave technic permits the use of a meter, and thus a better control of the dosage instead of the subjective sensation of the patient.

An interesting newer development in short wave diathermy is short wave "provocation" proposed as a diagnostic aid in suspected foci of infection, by Gutzeit,[32] who found a fairly consistent increase in sedimentation rate of the blood if short wave diathermy was applied to the site of an active dental infection. Similar results following short wave exposure of other sites of infection, especially the tonsils, were reported by Gutzeit and Kuhlendahl[33] and corroborated by Strauch[34] and Marder.[35] Popkin[36] reported the same in gynecologic conditions. As an explanation of this effect it was stated that the increased local hyperemia promotes elimination of inflammatory and bactericidal substances, which in turn temporarily increases the sedimentation rate.

This method was further developed by Liebesny[37] who set up a standard of dosage for dental provocation: a dial setting that will heat 2 cc. of normal saline solution by 3 C. in 10 minutes between two standard dental electrodes. However, the whole procedure has not been generally accepted and needs further controlled research.

Comment

The spectacular advent of short wave diathermy, its simplicity, its apparent safety, enabled persuasive salesmen to sell short wave apparatus on a very large scale to neophytes, and led to the belief that long wave diathermy is doomed to oblivion. Short wave diathermy in the hands of the inexperienced becomes generally little more than a glorified heating pad, applied in a hit or miss manner, because of the crude method of estimation of dosage and the lack of appreciation that treatment of different pathologic conditions requires clinical judgment and experience. The flooding of physicians' offices with one type of apparatus also fostered the belief that it is all there is to physical therapy, and led to the neglect of other indicated measures. In the opinion of seasoned observers, long wave diathermy still holds its own very well because of certain advantages of technic and also because the indispensability of spark gap apparatus for electrosurgery and its monoterminal high frequency treatments. Acquiring the technic of long wave diathermy is a desirable foundation for all electrotherapy procedures.

Conclusions

1. Short wave therapy is a convenient, flexible and comparatively safe physical measure for deep tissue heating. The specific biophysical effects claimed for short wave diathermy either have not been proven or have no special clinical significance in our present state of knowledge.

2. The general clinical applicability of short wave diathermy corresponds closely to that of long wave diathermy and includes subacute and chronic inflammatory conditions of deeper tissues and organs.

3. There appears to be a special field of applicability of short wave diathermy in some acute inflammatory and purulent conditions of the skin and possibly of some inner organs.

4. Lack of a generally accepted and practiced method of dosimetry is still a handicap in clinical use and in evaluation of laboratory research with short wave diathermy.

2 East 88th Street.

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36. Popkin, M. S.: Provocative Diathermy in Conjunction with Sedimentation Rate; More Accurate Guide in Determining Best Time to Operate in Elective Pelvic Surgery, J. Connecticut M. Soc. **3**:609 (Nov.) 1939.

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Discussion

Dr. Disraeli Kobak (Chicago): This provocative review on the present status of short wave therapy roughly marks the fifteenth anniversary of a discovery by an American physician who in 1925 and within the confines of a great American University enunciated a concept so radical that the profundity of its implication produced only the smallest ripple in the conscience of contemporary medicine. I have in mind the contribution of Schereschewsky at Harvard, who, not unlike two other illustrious

predecessors, d'Arsonval and Faraday, found a skeptical world unprepared to pass on the therapeutic merits of short wave radiation, similar to a world which failed to appreciate the earlier dissoveries of the physiologic action of medical high frequency current now designated as diathermy, and the potential qualities of the induction coil whose all prevading use and universal need has made it an implement of world importance. Today we can discuss the problems of the principles and practice of short wave diathermy with that dispassionate objectivity of things seen in prospective and evaluated by experience, because these separate contributions have been correlated by laboratory and bedside research into a procedure based upon concrete biophysical laws. It is therefore timely that one calls the attention of this Congress to the collective role played by some of its members in the most recent development of this historic drama, a drama as spectacular in its curative implications as that now attributed to the discovery and rational application of modern chemotherapy.

There is personal gratification in the recollection that the ARCHIVES was among the very first of publications in the world that stressed the potential value of short wave therapy and published the most critical as well as authoritative material on the subject. Of the American and foreign contributors to the pages of our official journal no one was more alert to both the possible values and limitations of short wave therapy than Dr. Kovács, and his conservative views are as much reflected in this report as they have been in the past. That over 700 papers have already been published on the laboratory phase and a fraction of that number on the clinical side of the problem is a commendable indication of the rational approach adopted throughout the world and the recognition that the test tube precedes bedside ministration. The danger if any at present and perhaps in the future use of short wave diathermy is and will be in its indiscriminate use as a panacea for all ills and the tendency to reduce its practice to a mechanized procedure by those who inadvertently attempt to use it as a form of canned heat for every possible ache or pain or functional disturbance. Dr. Kovács has continuously stressed its deep heat provoking possibilities, but unfortunately he has taken for granted that our orientation with this sovereign remedy—its pain relieving quality, its ability to increase the flow of blood and lymph, and its action on the autonomic nervous system—is sufficient for its scientific use in medical practice.

The danger at the present time is in its indiscriminate use for symptomatic relief of inflammatory conditions associated with pain and the like, and the current confusion with regard to control and regulation of the energy introduced and the technic of its application. These two phases actually form the very fundament of the problem of successful treatment. I feel that there is today greatest need for complete understanding of technics, indication and more rigid control of the energy converted heat absorbed by the patient. It was for this reason that studies were carried out by Mittelmann and myself to determine a means for rigid regulation and control of the quantity of heat introduced into living tissues and the results established in the ARCHIVES. The innovation of dosimetry in short wave therapy by Mittelmann provides us with a method as scientifically exact as that which is now utilized in the field of radiation. It introduces a check for the pinch and guess method dependent wholly upon the patient's sensation, and provides a method whose mathematical precision leaves nothing to the imagination of any technical aid. Despite its operational simplicity as recorded by us and others in recent publications there is still a certain amount of resistance and confusion regarding the technics most practical in the administration of short wave diathermy. Perhaps this paper will stimulate further study to clarify this important point to the scientific manipulation of this agency.

Dr. W. B. Seymour (Cleveland): Dr. Kovács has given us a comprehensive and logical summary of the value of short wave diathermy in medicine. He has summarily dispatched the idea of specific "athermic" effects of short waves, a concept wholly without foundation and one exploited ad nauseam by charlatans. It is by the application of heat to deep seated structures that short wave diathermy produces its beneficial effects.

Aside from the obvious advantages of short wave diathermy over the long wave type in the ease of application and avoidance of discomfort of the former, the "capacitative" heating effect of short wave diathermy is important. This is exemplified by the use of electromagnetic induction ("inductothermy"), in which the degree of heating of tissue is directly proportional to the conductivity. Since blood and extracellular fluid are the best conductors in the body, it follows that, no matter what tissue is being treated (1) the blood flowing to and from the part involved is heated, thus raising tissue temperature; (2) the extracellular fluid bathing the part involved is heated; (3) reflex vasomotor dilatation, consequent upon the elevation in temperature, causes a maximum increase in blood supply which hastens absorption of the products of tissue injury and aids in restoration of the tissue to normal. It must be remembered, however, that in excessively vascular tissues, such as heart or lung, the great vascularity dissipates heat so rapidly that little heating can occur, no matter what type of diathermy is used.

Although the absence of an accurate dosimeter for short wave diathermy is regrettable from the strictly scientific standpoint, it is practically of very little importance. Just as we use drugs such as digitalis, atropine, the opiates, parasympathetic stimulants, etc., until the desired

effect is attained, with only secondary regard to so-called accepted dosage, so should short wave diathermy be used, with proper evaluation of the patient and the nature and extent of his ailment. It should be emphasized here that frequently repeated applications and adequate prevention of heat loss by radiation, as emphasized by Schmitt (Chicago) and others, is a large part of adequate treatment, and is all too rarely employed in most clinics. Here again clinical judgment is the major factor in determining the amount of heating desired.

Some of us, who cannot see the ghost of "foci of infection" laid too soon, would not employ diathermy to provoke a so-called focus, especially since the criterion employed, the blood sedimentation rate, is in itself fraught with difficulties of interpretation.

Dr. Milton G. Schmitt (Chicago): It is a pleasure for me to exercise this privilege of discussing Dr. Kovács' paper, and the emphasis given to evaluation and dosimetry of diathermy is very timely. Dosimetry has been of very special interest to me for the past eight years, and it is this phase of Dr. Kovács' presentation that I desire to discuss.

I am a little at a loss to understand why Dr. Kovács uses me as a reference in this regard: "It is absolutely essential for the intelligent and efficient administration of short wave diathermy that some method of dosimetry be finally agreed upon. However, this opinion does not seem fully shared," and then Schliephake is quoted, and then "Schmitt of Chicago uses only a wattmeter to know the total power input, and relies on clinical judgment to determine the intensities suited to the different variables in each instance."

I published a paper within the last year of about twelve or fourteen pages in the ARCHIVES on the subject of optimum dosage. I thought that that was a paper on dosimetry and I thought that it was a very intensive effort to declare all of the factors which must be regarded in thinking about dosimetry.

I join Dr. Kovács in deploring the fact that there is a "lack of generally accepted method of dosimetry," and we agree that "one must recognize the elementary biological law of a minimum energy threshold as well as an optimum dosage for certain effects." It is evident that we all find it difficult to evaluate published reports because of the varied methods of application of short wave diathermy and the fact that many writers do not publish their exact technic in such reports. The varied useful power output and efficiency of the numerous diathermy machines manufactured for the profession adds greatly to this problem.

A most important step toward the standardization of technic would be the building of short wave diathermy units according to rigid specifications which would stipulate wavelength and useful power output within a narrow variation tolerance. For medical diathermy, a few wavelengths would suffice, and a useful power output of 200 watts would be adequate even for fever therapy. If such machines were all equipped with the same type of power absorption wattmeter then we might begin to place technics on a comparable basis for evaluation.

Dr. Kovács expresses confidence in the reliability of the milliampere meter for judging dosage when using long wave diathermy or even the contact-plate method with short wave diathermy. With the latter method, "it is possible to use a milliampere meter on the patient's circuit for direct measurement of the short wave energy." He states that "the meter of a short wave diathermy primarily serves as an indicator that energy is passing."

Dr. Kovács further states that a reliable method of dosimetry must be developed, and he implies that some accurate power-measuring device is our treasured hope and salvation. This concept, I fear, will only lead us to greater confusion or misunderstanding. It is now time that we lay aside all wishful thinking and stress the actual clinical value of measuring devices and come to a practical recognition of the conditions under treatment which demand clinical judgment.

Consider the statement, "In long wave diathermy the milliampere meter gives a reliable estimate of the strength of current passing through the area under treatment." The milliampere meter does measure the quantitative flow of current through the field of application, but this does not determine power absorption, nor does it indicate the power input per unit tissue volume. The power absorption in the patient depends upon the voltage drop over the patient times that portion of the current which is in phase with the voltage drop. Only when the power factor is unity and the voltage constant could one begin to assume that the milliampere reading is a reliable guide to power input determination. Such conditions do not prevail when treating human tissue with diathermy.

Mittelmann, Osborne, and Coulter have recently shown that in treating two persons even with identical thigh dimensions with similar current values as measured by a high frequency ammeter in series with bare metal contact electrodes, which is the contact plate technic referred to by Dr. Kovács, the heating effects differed due to the different electrical properties of the persons. The input of 1500 milliamperes current in each case produced a temperature rise in twenty minutes in the one of 2 F. and in the other 3.6 F. This suggests that there may be even a variation in the same patient on different days, repeating a measured, metered technic. This indicates the lack of reliability of the milliampere reading per se in determining the degree of heating effect in human tissue. The milliampere meter reading is misleading and is of little value in establishing measured technic for diathermy or short wave diathermy.

A high frequency wattmeter is an invaluable aid, as mentioned by Dr. Kobak, for measuring the power obsorption in the patient when short wave diathermy is applied, but it must be emphasized that this gives the total power absorption but does not measure the power input per unit tissue volume.

High frequency meters which merely indicate the flow of current and permit "tuning" of the circuit give no information regarding power input. The limit of tolerance for the normal skin for heat as determined by sensation, which is only subjective evidence, is an unreliable and unsafe guide for determining power input. A power input which produces a degree of heat equal to the subjective limit of tolerance of the normal skin is an overheating dose for inflammatory tissue. The power input per unit tissue volume is an ultimate determining factor in dosage.

Total tissue volume and total power input together determine the power input per unit tissue volume, but inasmuch as this volume in clinical practice cannot be determined, and since it varies with every patient and every clinical application of the short wave diathermy field, we cannot know the exact distribution of the total power input and therefore cannot accurately in a practical measure determine the power input per unit tissue volume. The rate of circulation in the body also cannot be determined in the pathologic tissue under treatment, but it definitely influences the effect of the power absorbed and both are in a state of continual change during the process of tissue recovery. The greatest limitation to power input from the viewpoint of safety is the presence of edema, and no inflammatory process is ever without edema, the degree of which is also an unknown, undeterminable, and inconstant variable as related to power input.

The actual temperature rise in the normal tissues as determined in clinical research is of no value in clinical practice because we are treating pathologic tissues which have a lesser heat tolerance; because there is no method of clinical depth heating measurement; because the same temperature rise can be obtained with variable technics of power input, time of application, and the method of short wave diathermy as well as the physical technical application of the diathermy field; and finally because there is no evidence at hand to indicate any specific thermal action which would support the practice of elevating the tissue temperature to any certain degree.

Inasmuch as the pathologic condition demanding treatment is the sole determinant of dosage, and inasmuch as there are so many variables in the pathologic field treated; and as the hand of a technician adjusts dials and meter readings according to a prescription, it becomes increasingly clear that the basic determination of optimal dosage must be the result of expert clinical observation and judgment.

Dr. Paul Liebesny (New York, N. Y): It is very important that Dr. Kovács in his excellent paper stresses the possibility of specific nonthermal effects of short wave currents.

Physical and biologic experiments have demonstrated specific electric effects in all kinds of electric currents. Such effects are for example the galvanotaxis induced by straight galvanic current, the oscillotropism induced by alternating current of low frequency and the pearl-chain formation in the electrical field of an alternating current of either low or high frequency.

In regard to the therapeutic application of short and ultrashort wave currents, it is my opinion that these currents surpass the long waves only where acute supporative processes are concerned.

All of the authors cited by Dr. Kovács are in agreement that for the treatment of acute supporative processes mild doses are to be used. This was my experience and opinion when short wave therapy was in its infancy about ten years ago. I have stressed this in a number of publications and have introduced the term "athermic dose." This term must be defined as follows: Athermic dose of short wave current is the amount of electric energy which will induce a rise of temperature on the skin of the treated area by no more than 0.5 to 1.0 C. The term "athermic" was chosen for didactic purposes in antithesis to the term "diathermy" since a number of laymen as well as physicians are of the opinion that the more heat produced, the better the effect.

In order to make the application of short wave in acute supporative processes without danger of overdosage an exact and uncomplicated dosimetry would be most important. With such a dosimetry terms like "mild dose" or "athermic dose" would become closer defined. It is not my fault if the term "athermic dose" has been misunderstood by some physicians or even abused by some charlatans.

Dr. William Bierman (New York): It is of interest to listen to these discussions concerning the subject of the short wave current, because until very recently it was assumed that interest in this subject had diminished. It is obvious that those of us who have paid particular attention to the use of this energy in medicine entertain diverse opinions, even though basically our impressions are more or less the same. Every new subject, every new method of treatment, is usually first received with a wave of enthusiasm if it demonstrates some clinical value. Short wave has differed from many another method in that to date it has not been discarded. It is still in use. The first expositions of the subject as called to our attention by the earlier workers who were largely in Europe, attributed results to some influences other than heat, and now the emphasis is on the heating factor. The fact that there must of necessity be a variation in physiologic response, not only in the normal but also in the abnormal, tends to show that this chapter in medicine has not come to its end as yet.

It is gradually simmering down, but there are many viewpoints to be ironed out.

Dr. Richard Kovács (closing): I expected, because there are so many sides to this issue, that there would be some controversy, and on the other hand, so far as the main use is concerned, we seem all to agree.

As to the question of dosimetry, we also agree there should be some dosimeter. Even Dr. Schmitt, who took great pains to tell us why these other measures are correct from the physiologic standpoint, and why the milliampere meter or wattmeter is not correct, finally concludes that we must rely on clinical judgment. I studied his article of twelve pages, and all I could do was to quote him as I did. It shows there is still a wide open question of what procedure of measuring we shall follow, and the only way to come to some understanding is by discussing it as we did.

MEDICAL NEWS

Dr. Schmidt Addresses Medical Groups

That Dr. William H. Schmidt of Philadelphia is much in demand as a speaker on the subject of physical therapy is evidenced by the following partial list of his engagements: On November 4th, Philadelphia Laryngological Society, "The Value of Physical Therapy in Otolaryngology"; November 21, Pennsylvania Academy of Physical Medicine, and the Section on Internal Medicine, "Physical Therapy in the Treatment of Peripheral Vascular Diseases"; November 24th, Section on Medicine, College of Physicians, "Physical Therapy and Its Relation to Internal Medicine"; Dr. Hobart A. Reimann will discuss this paper. December 5, Philadelphia Northeast Medical Club, at the Frankford Hospital, "Demonstration of Electrosurgical Technic"; December 12, Section on Oral Surgery, Philadelphia County Medical Society, "Malignancy in the Mouth."

Dr. Bennett Director Graduate School of Physical Therapy at Georgia Warm Springs Foundation

The course that is offered at the Warm Springs Foundation under the name of Post-Graduate Course of Physical Therapy was undertaken to permit graduates of approved courses in Physical Therapy the opportunity for continuing advanced study.

The purpose of this course is to encourage further study in physical therapy with particular emphasis on the care of poliomyelitis. It consists of a basic unit in which anatomy, physiology and pathology are correlated with the mechanics of normal and faulty bodily mechanics and an advanced unit in which the various fundamentals of physical therapy (electrotherapy, massage, hydrotherapy, corrective exercise, etc.) are correlated with physical medicine and surgery.

The course begins formally on July 15th of each year and lasts twelve consecutive months; however, a few students are admitted at intervals throughout the year. The student is paid $60.00 per month with full maintenance.

New York Physical Therapy Society

The New York Physical Therapy Society will hold a stated meeting, December 11, 1941 at 8:30 p.m. in the Physical Therapy Department, Third Floor, Hospital for Joint Diseases, 1919 Madison Avenue, New York, N. Y. The followng program will be carried out: Inspection of Department of Physical Medicine.

Demonstration, New Instrument, A Multiple Wave Generator. Discussion opened by *Abraham Ravich*, M.D. (by invitation):

1. Scientific Session —

Papers of the Evening

1. Negative Ionization in the Treatment of Certain Conditions of the Hand — *Jerome Weiss*, M.D. Discussion opened by *Lewis Dickar*, M.D. (by invitation); *Richard Kovács*, M.D.

2. Administrative Problems Encountered in an Active Institutional Physical Therapy Department. *Hans J. Behrend*, M.D. Discussion opened by *Karl Harpuder*, M.D.; *Charles R. Brooke*, M.D.

Physical Therapy Committee Indiana State Medical Association

The committee reports that forty per cent of the membership responded to a questionnaire relative to the value of physical therapy. The committee calls attention to the fact that our profession is deplorably unprepared to respond to the current demand of military authorities for adequately trained personnel in this field. The committee appreciates many of the problems involved in disseminating this education and has made every effort to become familiar with facts, working in cooperation with the Council on Physical Therapy of the American Medical Association.

In a supplemental report to the House of Delegates on Tuesday it recommends the formation of a liaison committee from the Indiana State Medical Association to work in cooperation with the

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ARCHIVES of PHYSICAL THERAPY

OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL THERAPY

.·. EDITORIALS .·.

THE SEASON'S GREETINGS

How strange at this Yuletide sound the words, "on earth peace, good will toward men"! Around the circle of this mad world are only "wars and rumors of wars." Millions of men, fine strong young men, are under arms, engaged in the most titanic struggle mankind has ever known. Nor is suffering confined to the battle field. The bombing of cities, the destruction of homes, the dislocation of populations with exposure and starvation bring death and despair to other multitudes of men, women, children, and aged. For many peoples today there is no liberty; no freedom of speech, no freedom of the press, no freedom of religion. Men scarcely dare to think their own thoughts for fear of detection and drastic punishment.

And now word has just arrived that our own beloved country has been attacked by an aggressor. Even so, we are more fortunate than other nations. We have had time to prepare our national defense. Our people are well clothed, well fed, and well housed. We still have our free American institutions and our democratic way of life. As a united people, we shall face the aggressor, grateful to the Almighty that our circumstances are so favorable.

No thoughtful person can enter this holiday season in the usual festive mood knowing that hardships, suffering, and death are abroad in the earth. With these thoughts and in this spirit, the officers of the American Congress of Physical Therapy and the Editorial Board of the ARCHIVES extend to our readers and advertisers the Season's Greetings.

PELVIC HEATING

Several technics have been employed for the application of heat to the female pelvis. One time honored method is the hot water douche. The value of this procedure is limited by the fact it is a form of conductive heat and, therefore, lacks penetration. Further, the perineal skin will not comfortably tolerate a temperature over 120 degrees F. The Elliott technic is an improvement over the hot douche because the vaginal distention produced by the bag favors greater contact and greater heating. An additional advantage is that the hot water does not touch the perineal skin. The use of superheated air instead of hot water in the Elliott bag as recommended by Falls, Newman, and Kobak[1] reduces the danger of vaginal burns by rupture of the bag and also removes the sense of weight in the pelvis.

Diathermy has been used for several years as a means of pelvic heating. The conventional method may be employed by anterior and posterior bare

metal plates or by the bare metal vaginal electrode of the Chapman or Bierman type. The plate method is now obsolete. Short wave diathermy may be applied by anterior and posterior insulated plates, by the bare metal or insulated vaginal electrode, or by the pancake induction coil. Of the various short wave technics, the molded bare metal vaginal electrode of Bierman probably produces the best rise in pelvic temperature. A close second, however, is the electromagnetic induction method by means of the pancake coil. Coulter and Osborne[2] have shown that this coil produces much better pelvic heating than anterior and posterior pads. Of all methods of short wave heating, the induction method is the simplest of application and the most comfortable for the patient.

There appears in this issue an interesting article by Bengston[3] describing a relatively simple procedure for heating the female pelvis. By experimental study, this author has developed a heating unit consisting of a special incandescent filament housed in heavy pyrex glass for vaginal application. Heat generation is controlled by accurate regulation of the current applied to the heating unit. Perineal skin is protected by rubber insulation. On a small series of patients, the clinical results of this procedure were favorable. The method appears to be deserving of further study.

We have, therefore, ten different technics for applying heat to the pelvis. The fact that good clinical results have been claimed for all of them, indicates that heat, which produces marked acceleration of the local circulation and stimulates the local defense mechanism, is our most important therapeutic agent in pelvic infections.

References

1. Falls, F. H.; Newman, L. B., and Kobak, Disraeli: Intravaginal Treatment of Pelvic Inflammation by Controlled Superheated Air, Arch. Phys. Therap. **20**:661 (Nov.) 1939.

2. Coulter, J. S., and Osborne, S. L.: Short Wave Diathermy. A Comparative Study in Pelvic Heating, Arch. Phys. Therap. **17**:135 (Mar.) 1936.

3. Bengston, Bengt N.: Internal Radiant Heat in Lesions of the Pelvis, Arch. Phys. Therap. **22**:719 (Dec.) 1941.

Internal Radiant Heat in Lesions of the Pelvis — Bengston

(Continued from page 719)

This unit is believed to be the simplest, yet the most effective device for heating deep tissues of the vagina in pelvic inflammatory disease. There is no discomfort from distention by bag applicators and no danger of necrosis from prolonged pressure.

Note: Owing to lack of space references will appear in reprints.

Medical News
(*Continued from page 742*)

Council on Physical Therapy of the American Medical Association and other organizations interested in this field.

Your committee recommends the adoption of the report as found in the Handbook and also the supplemental report.

The Reference Committee on Amendments to the Constitution and By-Laws of the House of Delegates of the Indiana State Medical Association, has made the following report:

In view of the splendid and important work accomplished by the Committee on Physical Therapy, we hesitate to criticize any suggestion proposed by it.

Standing Committees created by the Constitution and By-Laws were created for administrative and executive activities of the association only. We, your reference committee, feel there should not be any specialized standing committees specified in the Constitution or By-Laws, because the creation of any one such committee thereunder would open the way to any or all specialized committees for like treatment. Therefore, we do not recommend the adoption of this resolution. But we do heartily recommend to the President and the Executive Committee the continuance of the Committee on Physical Therapy for an indefinite period, to such time as, if and when its work may have been, if ever, completed.

We recommend the adoption of this report.

J. H. Weinstein, Chairman.
Ben B. Moore,
Weir M. Miley,
Max Adams,
L. G. Montgomery.

Shriners Recognize the Value of Physical Therapy for the Crippled Child

At the close of a vigorous campaign for funds which now assure the building of a $250,000 South Florida Crippled Children's Hospital, the Nobles of the Mystic Shrine at Mahi Temple, Miami, pledged themselves to donate equipment for a physical therapy department. Shriners have been the godfather of the crippled child for many years and they are responsible for several such temples of mercy located throughout America. Mahi Temple, by their action will serve as a stimulus to physical therapy in the Southeast.

The Penna. Academy of Physical Medicine

At the last regular meeting of The Penna. Physical Therapy Association, it was decided to change the name of this Association to be known as The Penna. Academy of Physical Medicine.

This change of name was decided on because of the similarity of its former name with that of other societies.

At this regular monthly meeting the following appointments and elections were made: Chairman of Membership Committee, Dr. *Harold Lefkoe*, Chairman of the Program Committee, Dr. *W. K. Browning*, 120 E. Center St., Merchantville, N. J.

Officers for 1941-1942:

President: Dr. *Maurice Weisblum*, 1823 Pine Street, Phila.

Vice-Pres.: Dr. *W. K. Browning*, 120 E. Center St., Merchantville, N. J.

Treasurer: Dr. *J. H. Hennemuth*, 235 Main St., Emaus, Pa.

Secretary: Dr. *Alfred J. M. Treacy*, 910 E. Chelten Ave., Germantown, Phila., Pa.

The November meeting of this Academy was held on Friday, November 21st, at the Phila. County Medical Building, and consisted of a combined meeting of the Section on Internal Medicine of the Phila. County Medical Society and the Penna. Academy of Physical Medicine. The following papers were read: Treatment of Peripheral Vascular Diseases, by Dr. *Wm. H. Schmidt;* Treatment of Anterior Poliomyelitis, by Dr. *Albert A. Martucci;* Treatment of Painful Conditions of the Shoulder, by Dr. *Oscar Wood.*

Alfred J. M. Treacy, M.D., Sec'y,
910 E. Chelten Ave., Germantown, Phila.

The American College of Surgeons' New Sound Motion Picture "White Battalions—Serving All Mankind"

Science and sympathy unite in service to the patient in the modern approved hospital, regardless of the patient's ability to pay—this is the theme of the new sound motion picture "White Battallions — Serving All Mankind, sponsored by the American College of Surgeons under a grant from the Becton Dickinson Foundation for the Extension of Scientific Knowledge, and which had its premiére in Chicago, November 21.

The story that runs through this newest film about our fortresses of health defense—hospitals—has an emotional appeal which furthers its educational purpose of acquainting the public with the spirit of service in the approved hospital.

Stirring incident, professional acting, expert photography and skillful direction give this film dramatic appeal to convey the facts about good hospital care. Personalities of the type that hospitals should choose and develop for their organizations were carefully selected to play the roles of administrator, surgeon and assistants, nurses and other hospital personnel. Individualization of the patient, the value of kindness and consideration, are emphasized, as well as the scientific aspects of hospital service.

Passavant Memorial, Children's Memorial, St. Luke's, Albert Merritt Billings, and St. Joseph Hospitals in Chicago, and Evanston Hospital in Evanston, cooperated in producing the film. The teamwork that is demonstrated within the hospital in the care of the patient, was shown by the personnel of hospitals, members of commercial

organizations, the professional cast, and the management and staff of the Chicago Film Laboratory, in the preparation of this film aimed to stimulate interest in all approved hospitals. The spirit of service is shown by all who had a part in making the picture.

"White Battalions—Serving All Mankind" will be available through the American College of Surgeons on a loan basis; and hospitals, churches, schools, and cultural and service organizations of many other kinds will find it suitable for their programs. Large and neighborhood motion picture theatres are already planning to use the film as an educational feature.

An informed, and hence a sympathetic public, can help the "White Battalions" to advance faster against the forces of death and suffering. In sponsoring and distributing this film, the American College of Surgeons hopes to enlarge public appreciation of the accomplishments and potentialities of the hospital that meets the requirements of Hospital Standardization, and to enlist active public interest in aiding "White Battalions —Serving All Mankind."

Physical Therapy in Hospitals

Writing in the July issue of *Hospitals* about the problem of "Keeping Trained Personnel in Physical Therapy Department During a National Emergency," Dr. Frederic C. Bost of San Francisco says that the administrator must be guided by two basic requirements, the first of which is the American College of Surgeons' standards for department organization, and the second, the educational standard for technicians established by the American Physiotherapy Association. Dr. Bost declares:

"Strict adherence to these requirements will insure the maintenance of the high standards of service which have been developed gradually and carefully since World War I. Only an insistence that these basic measures be met will protect the advantages gained over the past years."

That is a thesis applicable to all departments of the hospital. Dr. Bost proceeds to particularize concerning physical therapy as follows:

"Provision must be made at once to obtain sufficient numbers of adequately trained technical aides. Inquiry reveals that there are now registered approximately 1,500 proficiently trained physiotherapists. That present needs are not entirely fulfilled, is demonstrated by lack of unemployment and the difficulty in obtaining trained technicians. Miss Catherine Worthingham has estimated that perhaps 2,000 additional technicians will be necessary to adequately meet a national emergency. This is a modest estimate when all the requirements of expanded civilian employment and military forces are to be satisfied."

Dr. Bost suggests that the hospital administrator prepare for the emergency by cooperating in the registration of trained physiotherapists and students in physiotherapy; by aiding in the training of physiotherapists, by improving existing physical facilities in order to increase the efficiency of the service, by assisting the medical and physiotherapy departments to standardize certain procedures, and by working with the medical staff to organize physical therapy units for use with the military service. — (Bull. Am. Col. Surg. **26**:306 [Oct.] 1941.)

Council Approval for Emergency Courses

For the duration of the emergency the Council on Medical Education and Hospitals has extended its approval for the emergency course for physical therapy technicians at the Mayo Clinic, Rochester, Minnesota; and the D. T. Watson School of Physiotherapy at Leetsdale, Pa.

Congress Members Present Program at Meeting of the Philadelphia Medical Club

On December 5, at the Frankford Hospital, Philadelphia at a meeting of the Philadelphia Northeast Medical Club, the following program will be presented by members of the Congress, and the Pennsylvania Academy of Physical Medicine: "Demonstration of Electrosurgical Technic," Dr. *Wm. H. Schmidt;* "Physical Therapy in the Treatment of Fractures," by Dr. *Oscar Wood* of Temple University Hospital; "Physical Therapy in Poliomyelitis," by Dr. *A. A. Martucci*, of the Episcopal Hospital; "Short Wave Diathermy in General Practice," by Dr. *Benjamin Ulanski* of Northern Liberties Hospital, and "Iontophoresis," by Dr. *Maurice Weisblum* of Philadelphia General and Mount Sinai Hospitals."

Post Office Department Turns Off Some Lights

Ever since George Starr White issued his first bit of nonsense about the therapeutic effect of colors there has been a more or less continuous promotion of color therapy by those who dabble in pseudomedicine. Previous articles in *The Journal of the American Medical Association* dealing with the use of color therapy include the following:

"Spectro-Chrome Therapy" (Dinshah P. Ghadiali), Jan. 6, 1924, page 321.

"George Starr White—Quack," April 13, 1929, page 1292.

"The 'Spectro-Chrome' and 'Hocus-Pocus'" (Dinshah P. Ghadiali and E. A. Ernest), Aug. 1, 1936, page 362.

"Chromoray-Trioray" (Dinshah P. Ghadiali, E. A. Ernest, George Starr White and Karl von Schilling), Oct. 15, 1938, page 1490.

In 1941 the Post Office Department at Washington issued two fraud orders against persons and concerns which exploited the color therapy buncombe and in each case found it necessary to extend the fraud order to cover certain new names they were discovered to be using as evasions.

Ernest is the person mentioned in two of the titles listed. The 1938 article discussed at length

the hokum that Ernest employed in promoting his two devices "Chromoray" and "Trioray" in the field of so-called color therapy. In due time the Post Office Department began to look into Ernest's scheme of selling through the mails his "Trioray" (colored hand lenses) and his other device, a color lamp which had come to be known by the hyphenated title "Chromoray-Focoray." The Post Office issued a fraud order dated March 17, 1941, debarring the further use of the mails to E. A. Ernest and the Ernest Distributing Company. Less than two months later, however, the Post Office discovered that Ernest was continuing his fraudulent business under a new trade style, Ernest Short Wave Company. The Post Office on June 12, 1941, extended that order to cover the names of Ernest Distributing Company and its officers and agents, including E. A. Ernest himself.

Ernest J. Stevens has been doing business chiefly from San Francisco. The list of his devices in 1920 included "Nebulizers (3 styles), Balsam Bath Inhalants, Balsam Inhaling Masks (2 styles), Semi-automatic Air Pumps (2 styles), Internal Bath Outfit (Colon and Vaginal), Balsam Vaporizer (pocket size), Physicians' Balsam Vaporizer (pocket size), Electric Light Bath Cabinets" and "Electric, Steam and Hot Air Outfits, Hydro, Color and Light Therapy, Vibratory and Massage Outfits." His letter-head also bore the name "Stevens Light & Color Institute," and the letter, addressed to a physician, offered to "sell, rent or exchange, for office or home use, electric light bath cabinets, the light and color applicators and arm and leg baking oufits.

Stevens, like Ernest, came under the scrutiny of the Post Office Department, and a fraud order was issued May 17, 1941, against a long list of trade styles under which he operated. Among these were Stevens Helio-Scientific Company, Rainbow Publishers, E. J. Stevens Publishing Company and the E. J. Stevens Color Institute. The Post Office presented a number of authorities in the fields of bacteriology and physical therapy who testified as to the worthlessness of the defendant's color ray lamp (variously called "Stevens Helio-Energizer," "Stevens Chromo-Ray Normalizer No. 2" and "Stevens Chromo-Ray Projector") in treating the various disorders named, in conjunction with a certain "color charged" water.

The government further showed, among other things, that Stevens claimed to be an "Author, Artist, Physicist, Poet, Chromo-Dietitian, and Expert Human Analyst, christened by Luther Burbank, 'the Burbank of the Human Plant' . . . ." These and many other representations made for himself or his devices were declared to be fraudulent, and accordingly on May 17, 1941, a fraud order was issued against some the names under which he operated. These were the Stevens Helio-Scientific Company, the Rainbow Publishers, The E. J. Stevens Company, The Rainbow Publishing Company, The E. J. Stevens Publishing Company, The E. J. Stevens Companies, The E. J. Stevens Color Institute and their officers and agents, all of San Francisco.

As in many similar cases, the flaw in this fraud order lay in the omission of Stevens' personal name and so, like some others whose schemes have been debarred from the mails, he flouted the government and continued in business—by operating under a new trade style and local address, Chromolux Company, Stratford Hotel, San Francisco. His device also took on a new name, "Chromolux Lamp." But this trick was soon detected by the Post Office Department, which on July 12, 1941, issued a supplemental fraud order covering not only the name of Stevens himself but also the Chromolux Company, Lux Stevens and a good many other trade styles, old and new, under which he had been operating. — (Abst. J. A. M. A. 117:1642 [Nov. 8] 1941.)

Dr. Roy, Haiti, Honored

On November 7, 1941, at Restaurant Jacques in Chicago, Illinois, a luncheon was tendered in honor of Doctor Louis Roy, Assistant to the Minister of Hygiene, Republic of Haiti; Dr. Nicandro, Professor of Physical Therapy, National University of Mexico, and Major Kuhn Pratum, Medical Corps, Army of Thailand.

Among others present were: John S. Coulter, M.D., Professor of Physical Therapy, Northwestern University Medical School; Bryan H. Doble, President, Genelectric-Rayos-X. S. A., Mexico, D. F., Mexico; Harold J. Holmquest, Lecturer in Applied Physics, Northwestern University Medical School; Stafford L. Osborne, Ph.D., Assistant Professor, Northwestern University Medical School.

Section on Physical Therapy, Medical Society of the County of Kings Officers for 1942

At a meeting of the Section on Physical Therapy of the Medical Society of the County of Kings the following were elected officers for the year 1942:

Jacob Gutman, M.D., President.
Harold Neifeld, M.D., Vice-President.
Samuel A. Warshaw, M.D., Secretary-Treasurer.
Executive Board:

John J. Hauff, M.D.; H. Tevel Zankel, M.D.; Jerome Weiss, M.D.

Meetings will be held monthly at the Medical Society building of the Kings County Medical Society, 1313 Bedford Avenue, Brooklyn, on the second Thursday of the month.

Samuel A. Warshaw, M.D., Secretary
1373 Ocean Parkway, Brooklyn, N. Y.

BOOK REVIEWS

SCIENCE AND SEIZURES. NEW LIGHT ON EPILEPSY AND MIGRAINE. By *William Gordon Lennox*, M.D., Sc.D., Hon. Assistant Professor of Neurology, Harvard Medical School; Visiting Neurologist, Boston City Hospital; President, International League Against Epilepsy, etc. Cloth. Pp. 258 with 10 illustrations. Price, $2.00. New York and London: Harper & Brothers, 1941.

The literature is replete with scenes and stories, with romance and mysticism woven around the once inexplicable picture of the victim of a convulsive seizure. *Morbus Insputatus*, "the spitting disease," so-called by the ancients because of the foaming at the mouth, was a thing familiar to them, and the horror and distress that it communicated to those who were witness to such an occurrence created a conviction that the sufferers of such a malady were the victims of diabolical intervention. Thus supernatural interpretations of seizures have been so inbred into the folklore and the superstition of all peoples that even in this modern age one can witness in certain untraveled villages in Europe (as has the reviewer) incantations and exhortations for the purpose of driving the devil out of helpless epileptics. The author confesses that it has taken him twenty years to "stew" in his literary efforts, to complete this all inclusive and representative work. It must have been a troublesome but most satisfying labor, for in its present context it is a gem in factual and authoritative material introduced. The monograph explains the causes and clinical progress of convulsions and its related counterpart — migraine, their antiquity and scientific management in such clear and simple diction that it manages to retain all the romantic nuances of its mystical background without sacrifice of that critical objectivity found in scholarly discourse. It records the progress from ancient superstitions to modern trends and practices — from the casting out of devils to the use of latest drugs, diet and — delantin, from incantations to modern electroencephalography and psycho-pharmacological therapy. Twenty chapters are devoted to the problem of seizures and eight to the causes, symptoms and treatment of headache and its equivalents. Each of these two sections represents the best examples of compact information that could be introduced within the limits of two problems whose demands upon the profession have no equal in our practice. For a lucid, authoritative and interesting review of this subject we heartily recommend this contribution to physicians and their patients.

THE 1941 YEAR BOOK OF GENERAL MEDICINE. Edited by *George F. Dick*, M.D., Professor of Medicine, University of Chicago; *J. Burns Amberson, Jr.*, M.D., Professor of Medicine, College of Physicians and Surgeons, Columbia University; *George K. Minot*, M.D., Professor of Medicine, Harvard University; *William B. Castle*, M.D., Professor of Medicine, Harvard University; *William D. Stroud*, Professor of Cardiology, Graduate School of Medicine, University of Pennsylvania; *George B. Eusterman*, Professor of Medicine, University of Minnesota. Cloth. Pp. 848. Price, $3.00. Chicago: Year Book Publishers, 1941.

A volume such as this which includes a summary of the important articles in the field of internal medicine is a contribution which cannot be overlooked by any physician; not only for the physician who specializes in internal medicine but for every general practitioner and for every specialist. The reading of such a book is a short postgraduate course in general medicine. In keeping with the high standards established in the past, the different sections are edited by an outstanding authority in each particular field such as Dick for infectious diseases, Amberson for diseases of the chest, Minot and Castle for diseases of the blood and kidneys, Stroud for diseases of the heart and blood vessels and Eusterman for diseases of the digestive system and of metabolism. The changes which the field of general medicine are undergoing are so rapid and numerous that it is difficult to keep abreast of all of them. Therefore a volume which considers all the newer aspects should be welcome. The editorial comments following many of the articles are particularly valuable. The reviews include not only the English but the foreign literature as well although the latter is considerably less than in former volumes.

THE THERAPY OF THE NEUROSES AND PSYCHOSES. By *Samuel Henry Kraines*, M.D., Associate in Psychiatry, University of Illinois, College of Medicine; Assistant State Alienist, State of Illinois. Cloth. Pp. 512. Price, $5.50. Philadelphia: Lea & Febiger, 1941.

This author is conventional in making the subject of psychotherapy his principal basis of approach to the treatment of neuroses, and an indispensable adjunct to the treatment of psychoses. He gives credit to the early promise of shock therapy. The method of analysis and of synthesis is described in detail. Analysis is "a thorough study of the person from the physical, social, and psychological aspects." One finds some particularly apt formulations of the problems of personality. The selection of patients for psychotherapy is not stressed. Those who look for detailed technical description of narcosis, amytal, insulin, and electroshock methods will be disappointed. Prefrontal lobotomy is not mentioned. There is a foreword by Adolf Meyer, and a chapter on "The Structure and Meaning of Psychoanalysis," based on Healy, Bronner, and Bower.

THE TREATMENT OF INFANTILE PARALYSIS IN THE ACUTE STAGE. By Sister *Elizabeth Kenny* of Australia. Cloth. Pp. 300 with 80 illustrations. Price, $3.50. St. Paul: Bruce Publishing Company, 1941.

It takes courage and conviction to come forth with new ideas. This is especially true in medicine and when this is done by a nonmedical person against the general accepted theories of the medical profession, such fortitude must admired. Miss Kenny apparently evolved her new theory of neuromuscular paralysis from her own observations in Australia. She was met by opposition there as well as in England and arrived in the United States in 1940 to explain her treatment of infantile paralysis. This is her first attempt to put into book form her ideas and observations which apparently were started in Queensland, Australia in 1933. The book is divided into seventeen chapters, three appendices, an index but no reference table, and is nicely illustrated. In June, 1940, Miss Kenny had the opportunity to demonstrate her treatment at the Minneapolis General Hospital and the University Hospital, Minneapolis, Minnesota. Our conception of poliomyelitis is that it is caused by a virus, which affects the anterior horn cells of the spinal cord in various degrees from complete destruction to temporary dysfunction. The patient is quarantined for two to three weeks and the paralyzed muscles are supported by splintage and only when pain disappears and muscle testing completed, is muscle reeducation started. During this time symptomatic treatment and nursing are administered. Miss Kenny presents a conception of the pathologic changes and interpretation of symptoms which is not only different but often is opposed to our theories and explanations of symptoms. 1. She disregards all splintage. 2. Pain is mentioned as a cardinal symptom. 3. Spasm is interpreted as a primary cause and the paralysis is secondary. 4. Mental alienation is emphasized. It is evident that any treatment based on these points must differ widely from our present standards. Spasm, mental alienation and muscle coordination are the basis for Miss Kenny's treatment. She advocates early recognition of the spasm and the treatment of spasticity with hot fomentations. The mental alienation producing substitution movement is corrected by mental awareness of the proper muscles. Muscle reeducation is based on preparing the nerve paths for correct stimuli, passive movements and a minimum of active movements. Such radical departure from a treatment that has been built up after more than two decades of intensive work and experience could be disregarded if they were not acceptable to such authorities as Dr. Wallace H. Cole and Dr. Miland E. Knapp of Minneapolis. They report inconclusively on 20 cases of poliomyelitis that had been treated by Miss Kenny under their supervision. Their report shows about the same percentage of recovery that has been reported by old treatment. We should also remember that McCarroll of St. Louis has reported about the same ultimate result in patients treated early or late. It is unfortunate that the book has not been properly edited. The presentation is suffering from many tiresome repetitions. Such expressions as "The bath is filled to the desired fullness with warm water from underneath the body" do not make for easy reading. The danger of contagion during quarantine is not mentioned. The comments on braces and respirator seem to be unsubstantiated and dangerous. In spite of the shortcomings of the book it is stimulating to be challenged by new ideas and it is believed that the early treatment has not proven dangerous, the hot fomentations seem rational and there are many points of interest in the discussion of the muscle reeducation. We must await the final report from Dr. Cole and Dr. Knapp before we are willing to replace an old and well established method of treatment.

START TODAY. By *C. Ward Crampton*, M.D. Cloth. Illustrated. Pp. 224. Price, $1.75. New York: A. S. Barnes & Co., 1941.

This book apparently was written as an appeal to the laity for better health to be obtained through the use of exercise and diet and as a guide to the physician in helping the public attain a better status of health. There is a strong appeal to the public to have frequent physical examinations, and there are charts and questionnaires to aid a person in deciding whether he is in good health. The author divides general therapeutic exercise into three parts, namely, (1) anatomic exercises, the aim of which is to make the structure of the body straight and strong; (2) physiologic exercises, which stimulate the activity of internal organs in order to make them strong and enduring and (3) psychologic exercises to affect the mind and emotions, such as games and entertainment. The exercises are recommended to be performed every morning by everyone in order to obtain longevity and happiness. They are divided into seven basic parts. These vary from the exercise of the yawn and stretch on wakening in the morning to standing on the head and kicking the feet in the air. Although the list of exercises is long, they are said to require only fifteen minutes' less sleep in the morning than if the exercises were not carried out. The seven basic exercises are outlined briefly, as follows: The first is "stretching," which is a mild, preliminary stimulation of the body. This causes the muscles of the legs to contract and the back to straighten, and brings about organic massage and mechanical stimulation of circulation. The second exercise is known as "pumping" or "see-saw circulation massage," which is a preliminary abdominal massage and gives relief to abdominal congestion. The third exercise is known as 'kick-up," which exercises the abdominal muscles and allows getting out of bed in the proper mood. The author enthusiastically states, "This exercise (and others which will follow later) constitutes a self-applied semi-chiropractic treatment which has helped to take many spines out of a discontented state and make them happy again." Later he stresses all three of the above exercises, which are to be performed in bed before rising in the morning and which include yawning, stretching and kicking the bed clothes off, as essential to "getting out of bed on the right side." The fourth exercise is called "churning" and also "Kundalani." It is for further abdominal massage and "stimulation of the spinal cord and sympathetic

nervous system," and is performed by movement which "makes the abdomen travel in a circle while the head and hips stay exactly in the center of the circle all the time." The fifth exercise is known as N-E-W-S and is for training of the muscles of the trunk. It consists of bending the trunk "east," "west," "north" and "south." The sixth exercise is called "pep step" and is for training of the heart and stimulation of circulation. It is performed by hopping on one foot and then the other, or doing a war dance. Lastly, the seventh exercise is known as the "star gazer" and is essential for good posture for the day. It is this group in which the exercises vary from stretching the neck by backward bending of the head to standing on the head and kicking the feet in the air.

Many good exercises are given. Many are very strenuous, however, and by the author's own admission should not be prescribed except by a physician who knows "muscles as well as medicine." Much stress is placed on the stimulation of the intestines and claims are made that exercise is essential in relief of intestinal intoxication. According to the author, most of the common ills of man are due to intestinal toxins. He further implies that with proper training of the body, hypertension and cardiac disease could be prevented. He cited the death of a patient from pneumonia because the patient's heart was not properly conditioned and another patient who lived because his heart was "in condition." Statements are made that the heart can be made larger and more efficient and that the muscles of the blood vessels can be developed as well as skeletal muscles. The author's lists of diet are good. Although he warns against food fadism, there are statements made which might lead one to question whether the author may tend toward fadism. It is undoubtedly true that much the author has said concerning exercise is correct, and the enthusiasm with which the book is written is admirable. However, at times it can hardly be denied that there is more enthusiasm than scientific basis for many of the statements made. I would hesitate to recommend this book for general reading by the public. Many claims are made which cannot be proved. The statement that laughter is essential because it makes the diaphragm "pat the liver on the back," thereby causing it to function better, and the statement concerning semichiropractic treatment seem farfetched. The author's encouragement and great enthusiasm for frequent physical examinations and his consideration of the physical disability of the draftees are good. The book is well illustrated and interestingly written. It might have been much more valuable had the author not attempted to explain to the laity, on the basis of outmoded theories, why certain exercises are necessary. If the author had given acceptable explanations and had described exercises that could be performed with impunity by the average person, the book would be more useful.

CANCER OF THE FACE AND MOUTH. DIAGNOSIS, TREATMENT, SURGICAL REPAIR. By *Vilray P. Blair*, M.D.; *Sherwood Moore*, M.D., and *Louis T. Byars*, M.D. Cloth. Pp. 599. Price, $10.00. St. Louis: The C. V. Mosby Company, 1941.

The scope of this work is best expressed by the authors in the preface: "This volume is presented with the hope that a concise résumé of the observations made during the past twenty years on approximately 1500 cases of epithelial malignancy arising in or about the face and mouth will be of some help, when help is most needed, to the men who first see these cases and who bear the great responsibility of deciding what shall be done at a time when it is most likely that something worth while can be done." The first part of the book, consisting of nineteen chapters, reviews the various aspects of cancer, considering especially its characteristics on the basis of anatomic situation. Chapter II is of especial interest and value, since it embraces in its discussion the underlying principles of surgical destruction or removal. The place of radiation in cancer management is discussed in Chapter XVIII. In the last part of the book about 200 pages are devoted to operative technic, and each anatomic site is considered separately. There are 260 illustrations and 64 plates, the latter on operative technic. The authors believe that a judicious combination of four factors "should, on the average, give the longest possible period of relief with a minimum disfigurement and the least possible risk." These factors are: (1) early recognition and treatment, (2) selection of a rational plan of treatment, (3) adequate execution of the selected plan, and (4) adequate observation and care of the patient before, during and after treatment. This work is exhaustive in its scope and should prove enlightening to medical practitioners generally but particularly to those who are vitally interested in the cancer problem.

FOLLOWING A DOCTOR'S SATCHEL. AN M.D. TALKS FROM FIFTY YEARS EXPERIENCE. By *A. O. Scarborough*, M.D., Snyder, Texas. First Edition. Cloth. Pp. 96 with one plate. Price $1.00. Grand Rapids, Michigan: Wm. B. Eerdmans Publishing Co., 1941.

This little volume contains 26 short chapters of 1 to 5 pages each on such subjects as "The Love of Life," "Love of Money, Power and Approbation," "Fear," "Signs of the Times," "Conscience," and "High Ideals." There are no narratives of the author's experiences from his fifty years of medical practice such as one might expect, but the whole volume is devoted to the philosophy of life which he has developed as a result of these experiences. Nor is the material in this work entirely in the past for such up-to-date themes as John L. Lewis, Al Capone, and socialized medicine are mentioned. The work is couched in homely language which, although it may jar the sensitive ear, conveys the desired thought. It is recommended to those interested in the outlook of a physician who has devoted a long and useful life in the service of his fellows.

PHYSICAL THERAPY ABSTRACTS

Physical Therapy in Peripheral Vascular Disease. B. S. Troedsson.

J. M. Soc. New Jersey **38**:411 (Aug.) 1941.

Conway, using the Herrmann cycle, reported improvements in 80 per cent of patients with arteriosclerosis affecting the major and secondary arteries of the extremity. They were treated from three to six months. In 9 of 10 patients with sudden vascular occlusion the treatment was effective. In 4 cases of thromboangiitis obliterans no benefit was noted. Passive vascular exercises were employed without other treatment save the inunction of the skin, the care of the nails, and other simple measures. Without Pavaex treatments, Bernheim and London reported 84 per cent of cases of arteriosclerosis and 79 per cent of cases of thromboangiitis obliterans showed improvement. In addition to the medical management, physical therapy was used in the form of Buerger's exercises and warm soaks. Very light massage was also allowed.

Thus it appears that the actual value of the Pavaex treatment still has to be determined. Possible conditions in which the treatment would be indicated are arteriosclerosis with predominant involvement of the major and secondary arteries, acute arterial occlusion due to embolism, thrombosis, traumatism or operative ligation of major vessels and acute peripheral circulatory stasis as in frostbite.

De Takats and his associates have recommended a third method of treating peripheral vascular diseases. They adopted a triphasic cycle consisting of: (*a*) elevation of the extremity for one minute; (*b*) venous compression until rubor appears, and (*c*) horizontal position followed by release for a period twice the venous compression less one minute.

The Sanders bed essentially reproduces the action of Buerger's exercises in a more efficient manner and without any effort on the part of the patient.

Ion transfer with acetyl - beta - methylcholine was introduced by J. Kovács. The drug is applied to the positive pole of a galvanic current and follows the current into the tissues. The procedure has been advocated for use in chronic varicose and postphlebitic ulcers.

Buerger's exercises are extensively used. They consist of elevating the legs and resting them on a 45 to 60 degree plane until blanching appears, then sitting up and hanging them over the edge of the bed until rubor appears or the veins are filled. This is followed by rest in the horizontal position for thirty to sixty seconds. This cycle is repeated for twenty minutes several times during the day. The tendency is to prescribe these exercises in a fixed manner as for instance one minute up, one minute down, and one minute rest; or three minutes up, three minutes down and three minutes rest. This is wrong. The exercises should be individualized and the time determined by the blanching and rubor in some patients, and in others by the venous emptying and the venous filling time.

The Orthopaedic Treatment of Infantile Paralysis. Philip Lewin.

Illinois M. J. **80**:124 (Aug.) 1941.

In the acute stage Miss Kenny employs hot applications. These are applied from one joint to another, but not over the joint, in order to permit passive and active movements. These dressings are protected with oiled silk and more dry warm wool. They are changed every half hour during the first twenty-four or forty-eight hours. This is continued twenty-four hours a day. After the extremely sensitive period has passed, the procedure is carried out from 8 A. M. to 8 P. M. and then only every two hours. The fomentations gradually cool.

Gentle passive exercises are given, but never to the point of pain. These are carried out during the first two days of the sensitive stage. The patient's activities are directed and concentrated in the area of the tendon where movement is to be expected.

Any recognized type of splint which will maintain the correct neutral position can be used. In early poliomyelitis it is imperative to individualize the patients and to apply the measures appropriate to each case.

The author gives the positions favoring optimum return of muscle power.

Warm sea salt baths alleviate muscle and nerve pain. In some instances, they may be started very cautiously within seven days after the onset of the disease.

The present trend is toward less exercise, less activity, less massage, and less active treatment of all kinds. More attention is being directed to the prevention of deformities by means of rest in proper positions, with constant supervision of the most minute details.

The less patients are handled in the early stages, the better are the results. Usually the early treatment-sessions do not last over ten minutes and no more than three counts of an exercise are given to any individual muscle.

The majority of the patients are kept off their feet from ten to twelve months before they are allowed to attempt to stand or walk even with the support of braces and crutches. If, however, a patient is very slightly affected, his activities will depend largely on the return of power to the muscles of his trunk, pelvis and lower extremities. He would probably be kept off his feet at least six months.

Electro-Shock Therapy. A Reportorial Review. Joseph L. Fetterman.

Ohio State M. J. **37**:653 (July) 1941.

The electrical method represents a remarkable stride forward in the treatment of certain psychoses. The freedom from discomfort is such that most patients accept the treatment willingly. The complications have been remarkably few, especially when one considers the serious diseases for which these methods are used.

The experience at hand indicates that the chemical and electrical changes induced in the brain by the coma and convulsive method are capable of altering the course of certain disease processes. The severe depressions may be so modified that the mood is changed from melancholia to normal or to exuberance. Some patients with schizophrenia have responded well, but unfortunately certain types of schizophrenia present the downward course of malignant psychic disease. Neither the electrical method nor previous shock therapies have succeeded in altering this course. One may summarize the experiences to date with the remark that the electrocoma method promises to be a most valuable addition to psychiatric therapy.

Hypothermia for Cancer. A. F. Jones; J. Graham, and A. Mueller.

Am. J. Surg. **52**:14 (April) 1941.

Jones and his associates subjected 14 patients with inoperable and far advanced cancers to local and general hypothermia, not lower than 77.6 F. The periods of general hypothermia varied from thirty-six and one-half to one hundred and twenty hours. The periods of local reduction ranged from two hundred and thirty-six to seven hundred and ninety-two hours. Twelve patients were submitted to hibernation; 1 died during hibernation apparently because of cerebral edema superimposed on meningeal metastases, 8 died from three to seven and one-half months after hibernation, and 3 patients are living three and one-half, four and one-half and eight months, respectively, after hibernation. The 2 patients who were treated only locally died, respectively, within one and nine months. All patients complaining of pain were relieved in whole or in part following local or general hypothermia. — (Abst. J. A. M. A. **117**:140 [July 12] 1941.)

Intestinal Tuberculosis. W. R. Hewitt.

Dis. of Chest **7**:115 (April) 1941.

Artificial heliotherapy is essential in the treatment of tuberculosis of the intestine. It is preferable to sunlight because dosage is more accurately measured and because it supplies more of the beneficial rays and because it does not harm the lung disease as sunshine often does. The patient's entire body except for the chest and eyes which should be covered, should be exposed to a mercury vapor ultraviolet lamp. In some instances, the chest is not covered, but it is probably safer to do so.

The lamp is focused over the abdomen. Exposure is begun with one-half minute to back and to front daily with the burner placed at a thirty-six inch distance. The time is increased by one-half minute daily, or according to the individual tolerance. Burning is to be carefully avoided. When the exposure reaches thirty minutes to back and to front the lamp may be gradually lowered to thirty inches. Irradiation is continued this way over one to two years, depending on the progress.

Artificial Respiration and Resuscitation. R. Eisenmenger.

Deutsche med. Wchenschr. **66**:1420 (Dec. 20) 1940.

According to Eisenmenger, experiments in artificial respiration and resuscitation conducted on recently dead bodies of animals and man demonstrated that the abdomen constitutes the only peripheral site at which respiration as well as circulation can be favorably influenced at the same time and that best results are obtained by apparatus mechanically controlling alternation of air pressure and air suction. The modern theory, revised from one held twenty years ago, is that what counts is not the amount of oxygen, expressed in cubic centimeters, passed through the lung but the simultaneous action on the heart and circulatory system by which the actual passage of the air to the capillaries of the lungs, heart and brain is assured in the shortest possible time and carbon dioxide eliminated. In serious cases of asphyxia in which respiration and circulation are involved, the latter constitutes the problem to be attacked first. It is with this end in view that intracardiac injections of epinephrine are made into the myocardium or right cardiac cavity to stimulate the heart and restore circulation. Direct cardiac massage in operative cases in which the heart is exteriorized and manipulated by the hand of the surgeon similarly is intended to incite the action of the heart. Both procedures need to be accompanied by artificial respiration. Biomotors are of two kinds, of over pressure and under pressure (uberdruck and unterdruck). In the former an increased intrapulmonary pressure supervenes in the respiratory tract which affects the lesser circulation. In the former an increased intrapulmonary pressure supervenes in the respiratory tract which affects the lesser circulation. In the latter, normal pressure relations prevail. By means of artificial pressure and suction apparatus in animal experimentation, epinephrine, caffeine, and other drugs, intravenously injected, could be made to reach the heart and the central circulation even after the heart had already ceased its activity. Chemical agents can affect the nerve centers and thus influence blood circulation and distribution only if circulatory function still exists. If cardiac and circulatory action has already slowed down or ceased, mechanical intervention is in order. The author was able to observe the admirable results of mechanical resuscitation in cases of suffocation. Here cyanosis disappeared in from two to three minutes,

consciousness was restored, acute liver enlargement receded and the patient could be promptly given nourishment. Artificial respiration by mechanical means may also be applied in serious cases in which sudden death appears to impend but no grave organic trauma is manifest and cardiac paralysis and acute circulatory insufficiency have not yet set in. — (Abst. J. A. M. A. 117:402 [Aug. 2] 1941.)

Calcium Deposits in the Shoulder and Subacromial Bursitis. A Survey of 12,122 Shoulders. Boardman Marsh Bosworth.

J. A. M. A. 116:2477 (May 31) 1941.

The application of heat by one modality or another is therapeutically sound, but as an adjuvant rather than as a primary or basic form of treatment. The author uses it following operation to speed healing and recovery.

Not one of the painful shoulders in this series was subjected to roentgen therapy.

Immobilization of the shoulder, whether by swathe or by plaster encasement, is mentioned only to be condemned, because of the real danger of the formation of adhesions.

The author's practice has been to explain to each patient as simply as possible the underlying anatomy and pathologic condition and what his experience has been with the various modes of treatment. Choice of therapy is then left largely to the patient. The result has been that only a few patients ask for immediate operative relief. The majority decide to try heat applications, baking, diathermy or short wave. Some obtain complete relief after more or less prolonged treatment, but in most cases the relief is temporary or partial, with recurring attacks over a period of years. Six patients have returned for excision of the deposit.

While Bosworth feels that large deposits should be excised regardless of symptoms, to forestall the development of an acute attack of bursitis, no patient has yet been willing to have this done. Medium and tiny deposits should, in general, be treated conservatively and should be watched.

Among 6,061 supposedly normal persons of the white collar class, calcium was found on routine fluoroscopic examination in one or both shoulders of 165. Of this series 5,000 were studied at annual intervals over a three year period and provide the material from which the following conclusions are drawn:

1. Fluoroscopy and spot-film roentgenography are invaluable aids in the detection and precise localization of calcium deposits in the shoulder. 2. Calcium deposits occur most commonly during the period of greatest activity of adult life, and especially among males. 3. Serious illness, arthritis, rheumatism and infection, whether local or systemic, past or present, exert no influence on the formation or regression of deposits. 4. Occupations that require constant prolonged abduction of the arms foster the formation of calcium deposits in the shoulder. 5. A single trauma per se does not cause calcium deposition, although it is occasionally associated with the onset of an inevitable bursitis. 6. Although fluoroscopically visible calcium deposits may form within as short a period as two months, most deposits require a considerably longer time for their formation. 7. Medium and tiny deposits may disappear without symptoms, but large deposits always result in a painful shoulder sooner or later, though they may remain quiescent and symptomless for months or years. 8. Excision of the deposit is recommended as the best treatment for the acute attack, since it offers immediate, certain, complete and permanent relief.

Common Skin Diseases of Childhood. Louis A. Brunsting.

Texas S. J. Med. 37:33 (May) 1941.

The lesions of impetigo contagiosa are cleansed with soap and water after the dried crusts have been softened with olive oil. If the face is involved extensively, a moist compress in the form of a gauze mask soaked in a 1:4,000 solution of mercuric chloride is applied for half hour periods several times daily. Among the various topical antiseptic agents, ammoniated mercury ointment is perhaps most effective.

Ultraviolet irradiation of the affected sites is beneficial, especially in the case of infants and children, and the use of a borated dusting powder absorbs surface moisture and is slightly antiseptic.

Simple rules of treatment for acne vulgaris are effective and these can be summarized as follows:

1. Infected teeth and tonsils should be removed and the diet should be regulated by elimination of excesses of rich and starchy foods, condiments, stimulating drinks and chocolate. Brewers' yeast taken by mouth is a helpful adjunct.

2. The patient should be instructed to clean the skin several times daily with soap and water. Following washing at bedtime, the affected sites should be dabbed with an astringent such as lotio alba or Vleminck's solution.

3. The patient should sparingly use cosmetics, especially creams.

4. Actinotherapy is helpful in the form of either sun or artificial ultraviolet irradiation. Regular exercise and plenty of sleep are needed. Nervous factors and menses often aggravate acne.

5. The physical procedure which is of most value is roentgen irradiation.

Acute Occlusions of the Peripheral Arteries: Clinical Analysis and Treatment. Gamliel Saland.

Ann. Int. Med. 14:2027 (May) 1941.

No more dramatic episode exists in medicine, than the sudden onset of an arterial occlusion. In fact, the onset is so characteristic that the condition is seldom overlooked. Unfortunately, however, the proper therapy is often too long delayed.

The author presents an analysis of 31 cases of acute closure of the peripheral arteries to call

attention to certain clinical features that require emphasis, and to show that extremities can be saved when proper conservative measures are instituted. He also attempts to show that the loss of life in persons who are properly treated is not due to the acute arterial lesion per se, but rather to the basic disease that existed before the embolism or thrombosis occurred. If one can prevent the formation of gangrene, the chances of saving the affected limb and thereby prolonging life are proportionately greater.

In the conservatively treated cases of this series, the author used a combination of the foregoing measures, and adhered to the following routine. The patient was put to bed and was given one-half grain of papaverine intravenously as soon as possible. He was covered with wool blankets; warm water bottles were placed in the axillae when the lesion was in the lower extremities; and whiskey was given in one ounce doses, three times daily.

The patient was seen by a member of the peripheral vascular department as soon as possible, and the affected limb was placed in a suction pressure apparatus. The apparatus was so adjusted that during the negative phase, the skin of the limb would either become pink, or the superficial veins would fill; during the positive phase the skin of the extremity would pale, or the superficial veins would collapse. If the patient could stand it, he would receive six to twelve hours of continuous treatment. On the second day he would receive four to six hours, and then the treatment would gradually be reduced to two hours daily. They tried in most cases to give a minimum of 100 treatment hours.

The contraindications to the use of suction pressure therapy are, (*a*) pain during therapy; (*b*) infection; and (*c*) edema. The patients who received treatment presented neither infection nor edema, and in only one instance was pain during treatment a factor in the cessation of therapy. It was usually high negative pressure that caused pain and the negative pressure could often be diminished to the point where treatment could be tolerated.

Impetigo Contagiosa. The Streptococcic and Staphylococcic Varieties and Their Management. Stephan Epstein.

Wisconsin M. J. **40**:383 (May) 1941.

According to the author numerous methods have been advocated for the treatment of impetigo contagiosa. New procedures are published constantly.

The therapeutic principles involve, (1) removal of crusts and covering of blisters; (2) application of disinfecting and healing medicines; (3) and prevention of further expansion.

Streptococcic impetigo is a condition for the use of ointments. Ammoniated mercury ointment is efficient in many cases but it should be kept in mind that hypersensitivity to mercury is by no means rare. Severe contact dermatitis following its use is frequently observed.

In stubborn cases of streptococcic impetigo the application of local ultraviolet can be helpful although it is usually not necessary. In generalized persisting cases the general condition has to be checked; the use of cod liver oil, iron, and general ultraviolet is indicated.

In bullous staphylococcic impetigo, the application of local ultraviolet is of benefit in certain resistant cases.

Pemphigus of newborn is a type of bullous staphylococcic impetigo and requires special care. Hospitalization is desirable. All blisters are opened and are treated in the same way as bullous staphyloccic impetigo with 5 per cent silver nitrate. They may or may not be painted with a watery 2 per cent gentian violet solution. The lesions as well as the healthy skin are dusted with a mild antiseptic absorbing powder.

Ointments should be used only after the spreading has been checked definitely and their use is required on account of dry crusts. Ultraviolet irradiation is of help in prolonged cases, especially in debilitated patients.

Keeping Trained Personnel in Physical Therapy Department During a National Emergency. Frederic C. Bost.

Hospitals **15**:54 (July) 1941.

The hospital administrator may prepare for the possible national emergency by

(1) Cooperating in the registration of available assistants.

(2) Aiding in the training of physical therapy technicians through the expansion of existing approved schools of physical therapy, and the establishment of additional schools of physical therapy. The cooperation of several hospitals could be utilized if sufficient single hospital facilities were lacking.

(3) Improved existing physical facilities within the hospital under his guidance.

(4) Working with the assistance of the medical and physical therapy departments, toward the standardization of certain procedures. There are many objections to standardization of procedure but carefully planned and supervised measures might be utilized to lighten the burden of the personnel.

(5) Working with the medical staff of the hospital in aiding national defense by the organization of physical therapy units for use with the military service.

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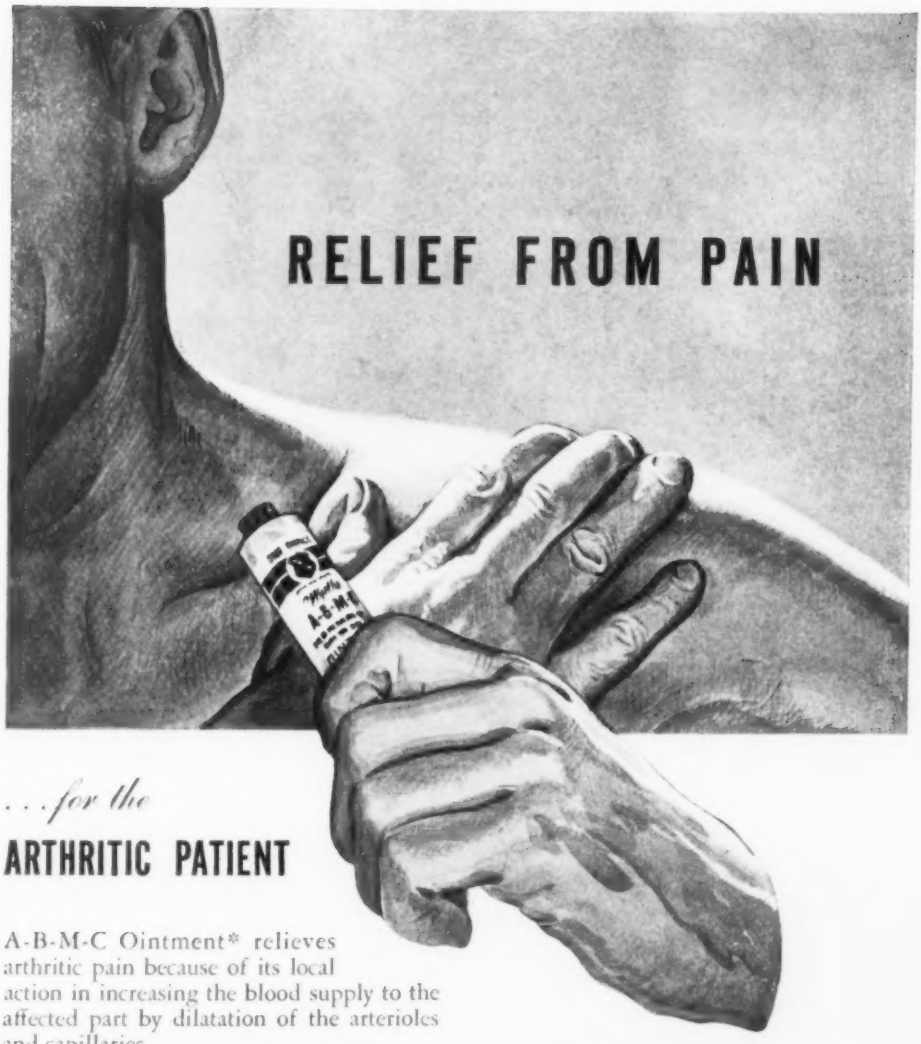

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†Archives of Physical Therapy, *21*, 12 (Jan.), 1940.

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